JANUARY 1957

World Petroleum

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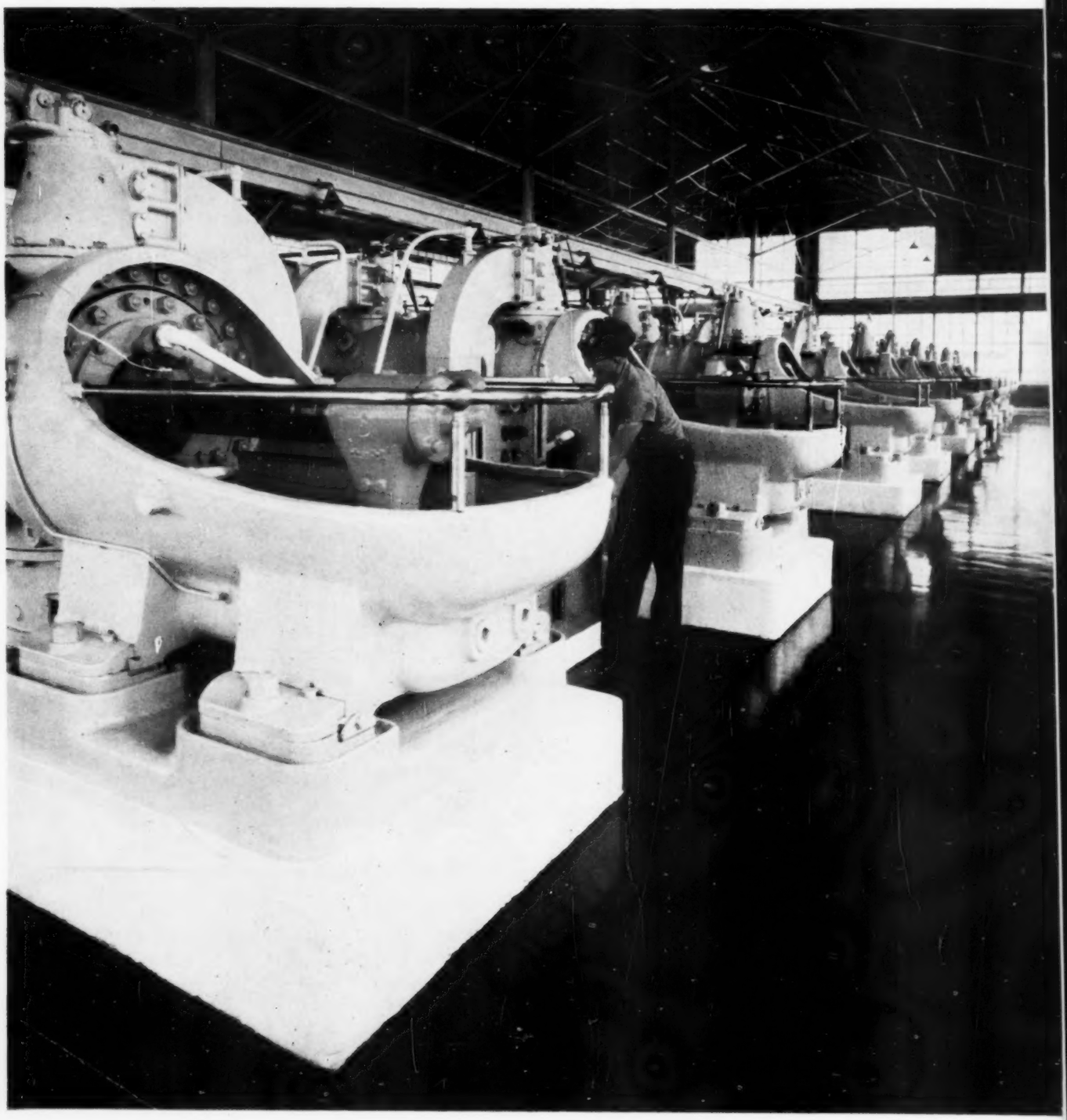

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When you need...

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SERVICE...

Whatever the GRADE and the VOLUME of

NATURAL GASOLINE

Just rely on WARREN'S versatile facilities to give you dependable deliveries . . . WHERE and WHEN and the WAY *you* want them.

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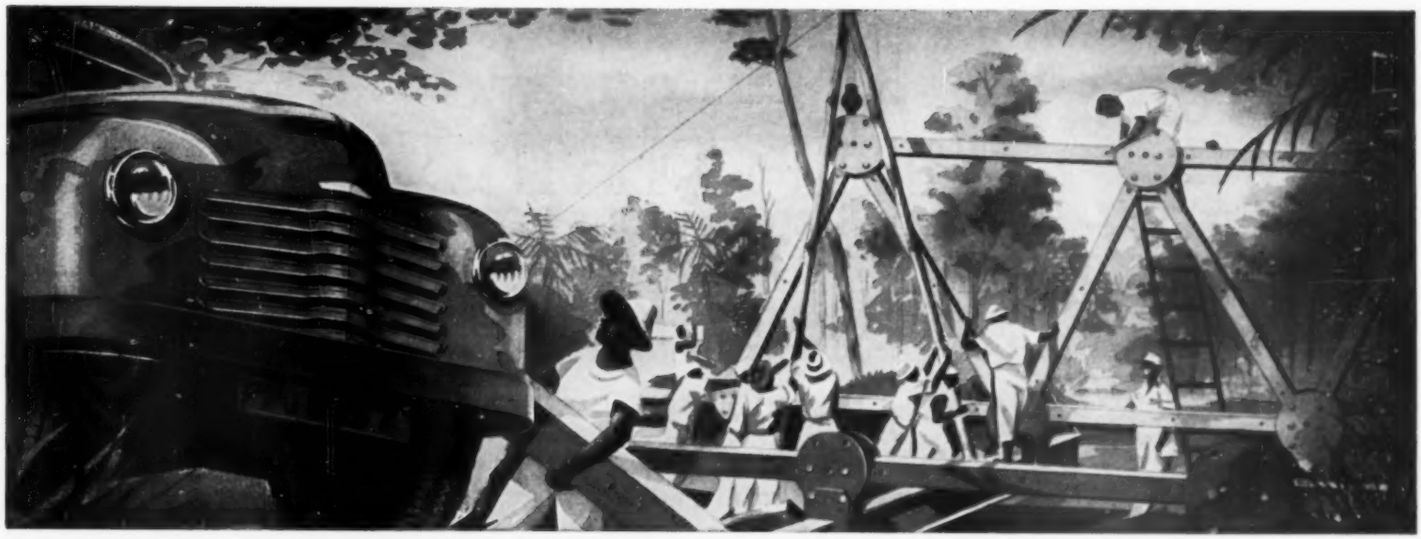

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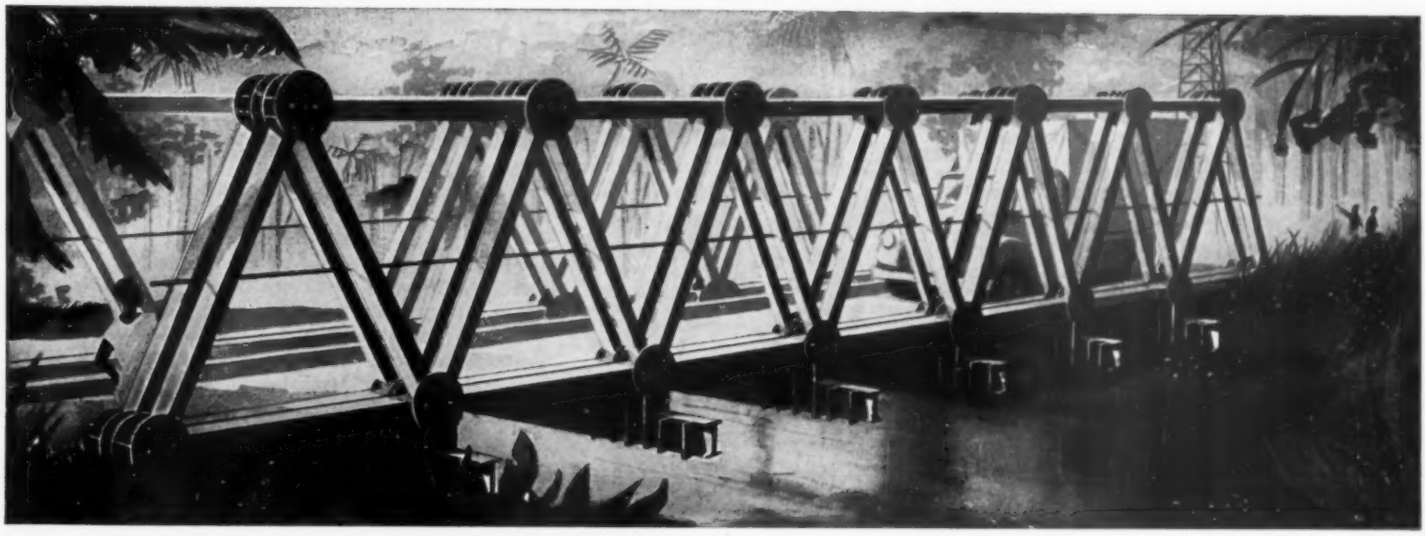
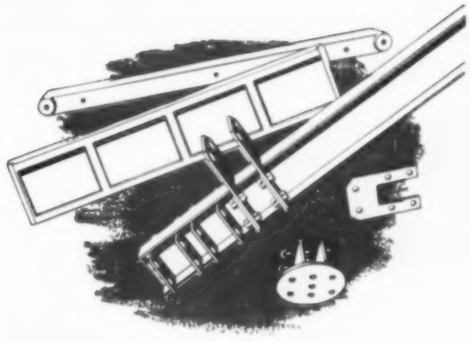


remote up-country sites

Butterley Standard-Unit Bridges are in use all over the world where transport is difficult, skilled labour scarce or where site preparation has to be carried out under adverse conditions. From five standard units, all sizes of bridges can be built; the units can be sent by any form of transport; site erection is remarkably simple and swift with an absolute minimum of equipment.



THE BUTTERLEY STANDARD-UNIT BRIDGE

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McCullough Back-Off Service Aids in Recovery of an Extra 3600′ of Stuck Pipe

In some stuck pipe conditions McCullough's Magna-Tector (Free Point Finder) will indicate that working the pipe may free it further down the hole. In this instance the stuck drill pipe was actually loosened 3,600′ below the original sticking point.

Operator was drilling at 5,668′ with 3½″ Full Hole Drill Pipe when pipe stuck. This was a 32° angle directional well.

McCullough was called to run their combination Magna-Tector, String Shot Back-Off. Lowest free point was found at 1,900′. However, the Magna-Tector reading indicated that the drill pipe might be freed further down the hole.

Pipe was worked for 2½ hours and the combination Magna-Tector, String Shot Back-Off was again run. Pipe was found to be free at 5,500′ at the top of the drill collars. The String Shot Back-Off was positioned and fired and pipe was recovered from that point – a bonus of 3,600′ of drill pipe.

McCullough's new combination "One Trip" Back-Off Service obtained the free point reading and fired the back-off shot on a single trip in the hole. Thus, all free pipe was backed off and started out of the well almost immediately after the lowest free point had been found – and before it had a chance to re-stick further back up the hole.

Magna-Tector Helps Save 12 Days Fishing Time on Stuck Pipe Job

Operator Estimated 21 Days to recover 7760′ of Stuck Drill Pipe — Job Actually Completed in 9 Days with Aid of McCullough Back-Off Service.

The time-saving benefits of McCullough Back-Off Service in pipe recovery operations were strikingly demonstrated in this deep California well.

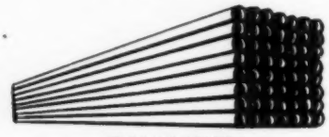
Operator was drilling at 11,360′ when 4½″ O.D. drill pipe became stuck. Only surface casing had been set and hole was open from 500′ to 11,360′.

McCullough was called immediately. The Magna-Tector (Free Point Finder) located the lowest free point in the stuck string at 3,600′. A String Shot Back-Off was fired at that point and the free pipe was removed from the hole.

At the time of the first back-off the Drilling Superintendent advised his head office that it would require an estimated 22 washover operations, 22 String Shot Back-Off shots and 21 days of rig time to recover the remaining 7,760′ of stuck drill pipe. However, due to reliable free point determination, the job was completed in only nine days. After each washover operation, McCullough's Magna-Tector was run to confirm that the washed-over pipe was free. In each instance the Magna-Tector discovered that pipe was free a considerable distance below the lowest washover point. McCullough's String Shot Back-Off successfully loosened the lowest free joint in every case and permitted fast recovery of the freed sections.

SAVE TIME

SAVE MONEY



SAVE PIPE

Instead of 22 separate washover and back-off operations, the use of McCullough Back-Off Service enabled completion of the job in only four recovery operations.

Count the savings this operator made through his foresight in calling for McCullough Back-Off Service. Saved – 18 String Shot Back-Off shots – 18 separate washover operations – 12 days rig time.

It pays to call for McCullough Back-Off Service. You'll save time – save pipe – save money!

Call for – McCULLOUGH BACK-OFF SERVICE

McCullough "One Trip" Back-Off Service is now available in most service areas – performs all back-off operations in one electric wire line run in the hole – ask your McCullough Service Engineer.

McCullough® TOOL COMPANY
Cable Address: MACTOOL

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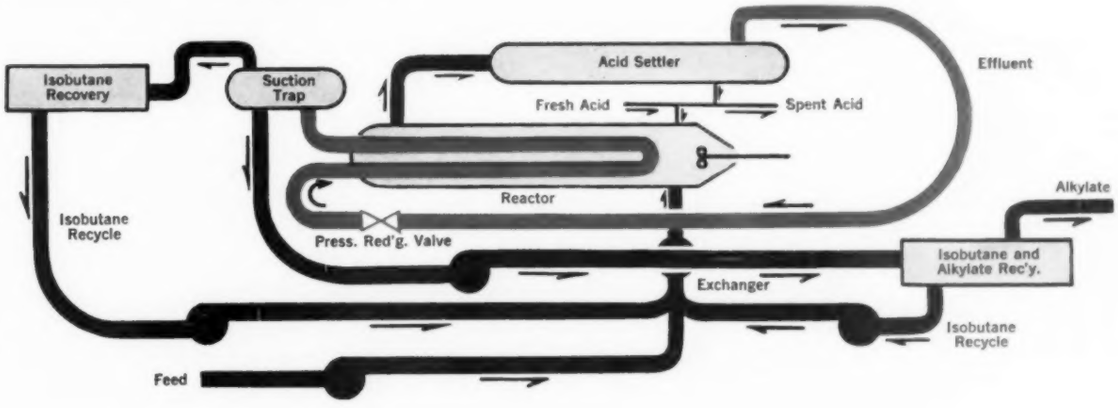
HOUSTON
EDMONTON

WORLD PETROLEUM FOR JANUARY, 1957, Vol. 28, No. 1, January, 1957. WORLD PETROLEUM is published monthly by Mona Palmer, Trustee under the will of Russell Palmer, 604 Fifth Ave., New York 20, N. Y. Accepted under Section 34.64 P.L.&R. at Bristol, Conn. Subscription rate: $10.00 per year, single copies $1.00. Copyright 1956, by Mona Palmer, Trustee.

LOW-COST alkylate

FOR MOTOR OCTANE

effluent refrigeration



H_2SO_4 consumption—as low as 0.3 lb per gal of alkylate

EFFLUENT REFRIGERATION, the most important advance in alkylation technology in 15 years, now classifies alkylation as a most valuable process technique for production of the higher octanes. A substantially decreased acid consumption, higher yield of higher octane and a reduction in fractionation requirements for motor alkylate production are the major factors responsible for this most important process improvement.

An effluent refrigeration alkylation unit designed by Foster Wheeler is now being constructed for a major mid-western refiner. Capacity, 3,800 bbl per day of motor alkylate.

Flow description: Feed, mixed with recycle isobutane, enters reactor through heat exchanger. Thorough agitation with sulfuric acid, and high-isobutane ratio maintain optimum reaction conditions. Total reactor effluent separates in acid settler, acid returns to reactor. Hydrocarbon effluent from settler flows through pressure reduction valve into cooling coils in reactor maintaining predetermined temperature therein. Vapor and liquid separate in suction trap. Vapor, mainly isobutane, is recovered and returned to reactor. Liquid is pumped through heat exchanger to fractionation system where recycle isobutane and product alkylate are recovered. For further information write to *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

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Washington PIPE LINE

By Joseph B. Huttlinger

The Middle East crisis is bound to have a widespread impact upon oil's largest single customer—the Armed Services Petroleum Purchasing Agency.

Higher prices for products may come along. And there may be troubles in obtaining some products where needed and when needed. As a result, ASPPA is taking an overall look for steps to obtain its needs at least cost in dollars, time, and effort.

During fiscal year 1956, which ended June 30, 1956, a total of $1,059,216,465 was spent by ASPPA for petroleum products, more than half for aviation gasoline and jet fuels.

Though the USA is the main source of supply, ASPPA does buy petroleum products over the world.

An approximate breakdown, in dollars, of the sources of the products shapes up like this, according to ASPPA:

United States	$831,092,000
Persian Gulf	61,191,000
Caribbean	88,966,000
Other	77,967,000

A total of 223 million barrels of products was bought by ASPPA. During the year some 95 million barrels of these were loaded on tankers by ASPPA, through Military Sea Transport Service. A total of 986 tanker loadings took place.

The Defense Department announced, November 30, crude petroleum continues exempted from the Buy-American act. Action came the same day the oil lift was announced. The act calls on US agencies to give preference to domestic goods unless there is specific exemption. Usually the exemption is for short-supply reasons. As for crude oil, the USA is seen as the major source of crude supply for the free world.

Tubular-Goods Output to Rise

US steel mills will produce 2,700,000 tons of oil-country tubular goods during 1957, it is estimated by the US Department of Commerce. This is about 150,000 tons more than in 1956.

A rising demand for oil-country tubular goods is foreseen for years ahead, and the demand will be for better grades of pipe as more and deeper holes are drilled.

"The steel industry is aware of these requirements and the need for upgrading their products," a government official said. A number of plans are in process, therefore, for additional heat treating and finishing facilities to provide better pipe." The views were given at the first meeting of the industry advisory committee on oil-field machinery and equipment.

H. B. McCoy, administrator of the Department of Commerce Business and Defense Services Administration, attended, with other Commerce officials including Robert E. Oliver of the Iron and Steel Division. Presiding was John F. Skillman, deputy director of the Agricultural, Construction, Mining, and Oil-Field-Equipment Division. His chief aides were on hand, Oscar T. Madsen, assistant director, and A. W. McKinney, consultant.

At the meeting there was talk that the steel industry needs higher prices or more fast tax write-offs to add to capacity.

A government official said:

"New facilities for the manufacture of oil-country goods are coming into operation in 1957, and one steel company's new electric weld mill is to be devoted to the production of line pipe 5$^{9}/_{16}$ inches to 5$^{3}/_{4}$ inches in diameter.

"These new facilities should free up seamless capacity so that a substantially increased output of seamless can be anticipated, with some of it finding its way into the oil-country goods field. Two other new facilities will add to supply in 1957."

Prefers State Control

K. D. Malaviya, Indian Minister for Natural Resources and Scientific Research, says he prefers State control of oil, after a visit to the USA, Canada, and France.

We can get out our crude petroleum "cheaply and perhaps also speedily," he told an audience on his return, defending State prospecting. USA regulations, he said, are not more liberal than those in India. Pressed to tell why, then, private capital did not enter into India's petroleum development with more vigor, he said he did not know.

He foresaw aid from the USA in aerial surveys, visit of technicians, and said India welcomes aid of technicians.

The Indian government is pressing a 300 million rupee petroleum expansion program.

Pipeline Report Filed

Bechtel Corp. has filed its report to participating oil companies on the merits and demerits of a trans-European oil pipeline system. Bechtel Corp. was assigned, several months ago, to study the technical and economic practicability of a line, as well as its desirability.

The corporation is SAPPEUR (Company for Planning of Pipeline Projects in Western Europe). Participants at the outset were Bataafsche Petroleum Maatschappij, 99.5% owner, and Nederlandse Internationale Industrie, both affiliates of Royal Dutch-Shell group. Managing board of the corporation consists of A. Hofland, of London; J. L. van Krimpen, of The Hague; G. C. Fitzgerald, of Barnston, England; and P. P. Escoffier, of Genoa, Italy.

Representatives of various European companies which attended an organization meeting included:

British Petroleum Co. Ltd.; California Texas Oil Co.; Compagnie Financière Bèlge des Pétroles SA; Compagnie Française des Pétroles; Deutsche Erdöl AG; Gelsenberg Benzin AG; Royal Dutch-Shell group; Pechelbronn SAEM; Ruhrchemie AG; Scholven Chemie AG; Socony Mobil Oil Co. Inc. Standard Oil Co. (N. J.); Union Rheinische Braunkohlen Kraftstoff AG.

Question Antitrust Exemption

Some US senators—Joseph C. O'Mahoney (D., Wyo.) for one—raised questions about the antitrust exemption for the plan of action of the MEEC. Oil-company officials sought strong assurances that the cooperative effort would not lead, later, to an antitrust crackdown. Oil men recalled the Madison case, where cooperation in the National Recovery Act days of the 1930's was followed by filing of an antitrust action.

FPC Ducks Issue

There's bad news for US natural-gas producers in a three-to-two decision of the Federal Power Commission in the case of Union Oil Co. of California, and others. Union asked permission to raise the natural-gas price in Louisiana to 17 cents per 1,000 cu ft from 9.797 cents. Other producers in the same field asked the same. On sales to Transcontinental Gas Pipe Line Corp., Houston, Transco agreed to the higher rates. This case is regarded as a test in the FPC's new price controls over producers.

FPC asked if this amount of price increase "is needed" to obtain the volume of gas needed for Transco. Union and the others refused to talk of this matter. FPC then said that arms'-length bargaining is not proof that the rates are reasonable.

"On this record," said the majority, "it is not possible to strike a fair balance between investor and consumer interests. We cannot be sure that the rates are sufficient to promote exploration for and development of gas supplies and, at the same time, to provide the protection to the ultimate consumer contemplated by the act.

"Indeed, a delegation of power to make rates interpreted as broadly as the applicants would have it would permit the unregulated market to determine rates in the name of regulation."

Minority members thought it up to the commission, if it did not like the proposed rates, "to determine a lawful rate." The least the commission could do, they felt, was "to order reopening" of the case to get any testimony the commission needs. In view of the wide uncertainty, and the complete gap in what is or is not a fair rate for natural gas, the dissenters said:

"The commission is under a duty and obligation to the industry to express for the first time its policy with reference to the nature of testimony upon which a lawful rate can be fixed."

When this will come, seems as far off as it was on June 7, 1954, when the US Supreme Court ordered the FPC to control, for the first time, the prices of gas sold by independent producers.

Equipment Sales to Rise

The petroleum industry may spend $841 million for new plant and equipment in the first quarter of 1957, according to a report from the Department of Commerce and the Securities and Exchange Commission.

The figure is based on plans of the industry as reported to the government agencies.

This compares with $627 million in the first quarter of 1956 and $490 million in the first quarter of 1955.

During all of 1956, the outlay is estimated at $3,182 million; for 1955, $2,798 million; for 1954, $2,684 million.

The figures are for petroleum and coal products, but the largest part of it represents oil spending. The figures refer to spending for manufacturing plant, and not—for instance—for crude production.

Asks MEEC Inquiry

Senator Joseph C. O'Mahoney (D.,Wyo.), who has a yen for hard enforcement of the antitrust laws against "big business," is asking for a congressional inquiry into the oil lift to Europe.

Discussing the cooperative effort to pool tankers, crude-oil supplies, refinery runs, and the like through the Middle East Emergency Committee, O'Mahoney said:

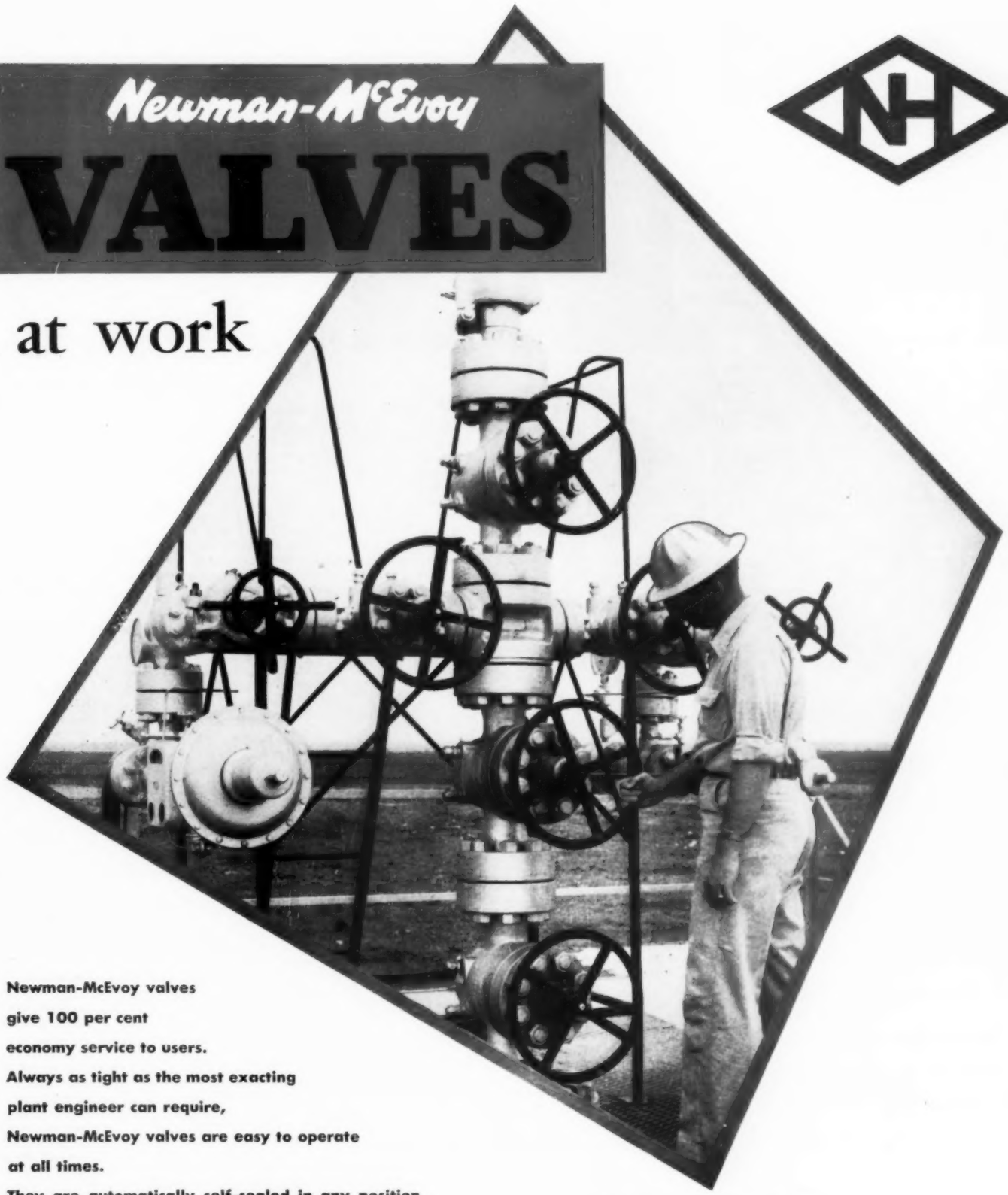
"Now, it's a curious fact that most of these big companies which are on the committee which was named under that order are themselves defendants in an antitrust suit now pending in the Southern District Court of New York State.

"We pretend to believe that in the United States we want free enterprise. Now, isn't it absurd to think that we're aiding free enterprise when we appoint 15 oil companies to make the rules for this very important aspect of our foreign policy?"

Equipment Sales to Rise 15%

Secretary of Commerce Sinclair F. Weeks foresees a 15% gain in sales of oil-field machinery and equipment in the first half of 1957, compared with a year earlier. In an outlook statement he said that increased exports of crude and the normal increase in US demand point to a substantial increase in the number of wells to be drilled.

Newman-McEvoy VALVES at work



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A Christmas Tree Assembly with Newman-McEvoy Valves in service at an American Controlled Oilfield

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Canadian Notes

Husky Companies to Merge

Glenn E. Neilson, president of Canadian Husky Oil Ltd. and Husky Oil & Refining Ltd., announced that Canadian Husky's offer to exchange its common and preferred shares for those of Husky Oil & Refining Ltd. has been declared effective. Enough shareholders have accepted the offer that Canadian Husky now holds approximately 86% of the outstanding common shares of Husky Oil & Refining Ltd. and more than 80% of its preference shares.

Files Registration Statement

Trans-Canada Pipe Lines Ltd. has filed a registration statement with the Securities and Exchange Commission in Washington covering a maximum of $120 million in Canadian funds. Proceeds of the financing will be used as a part of the $375 million needed to construct a 2,287-mile natural-gas line extending from Alberta to Montreal, with a delivery capacity at the outset of 300 million cubic feet per day. Already, $30 million has been spent directly in constructing 230 miles of 34-in. pipeline in western Canada and 75 miles of 20-in. pipeline in eastern Canada.

Trans-Canada will raise approximately $250 million; and the government of Canada, with the participation of the Province of Ontario, will provide the balance. The Federal and Ontario governments' contributions will be in the form of ownership of a portion of the line extending from the Manitoba-Ontario border 675 miles eastward to Kapuskasing. This section is being leased to Trans-Canada for 25 years with an option to purchase.

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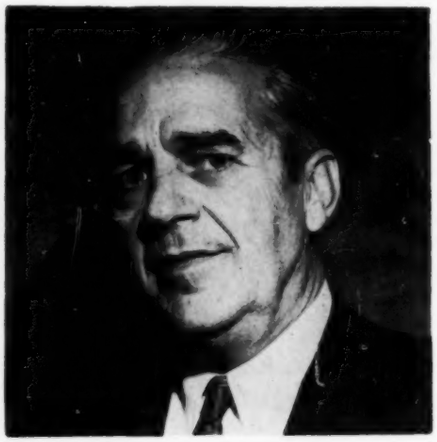


R. C. Brown

Brown Heads CPA

R. C. Brown, president, Hudson's Bay Oil and Gas Co. Ltd., was elected chairman of the board of governors of the Canadian Petroleum Assn. at the annual meeting, December 7. He succeeds G. L. Knox, president of The California Standard Co.

Re-elected to the board, in addition to Messrs. Brown and Knox, were: C. U. Daniels, Royalite Oil Co. Ltd.; G. E. Dunlap, Sun Oil Co.; Bart W. Gillespie, Home Oil Co. Ltd.; Vernon Taylor, Imperial Oil Limited; T. W. G. Thomson, Texaco Exploration Co.; O. I. Torkelsen, The British-American Oil Co. Ltd.—all of Calgary; and R. A. Cruickshank, Canadian Devonian Petroleums Ltd.; V. H. Hunter, Imperial Oil Limited; C. E. Leach, Tidewater Oil Co.; D. M. Tyerman, MacPherson, Leslie and Tyerman—all of Regina. New members on the board are: J. G. Spratt, Triad Oil Co. Ltd., Calgary; and W. L. Powell, The British-American Oil Co. Ltd., Regina.

G. L. Knox, retiring chairman, stated that the education and public-relations work of the association were of high importance in 1956. He referred to the variety of programs on oil-industry operations presented at public meetings and in schools.

Bart W. Gillespie, chairman of the public-relations committee, urged the meeting to continue support of the public-relations work of the association. He stated that a notable improvement in understanding between oil crews and the public was the result of programs held in oil towns.

General Manager John W. Proctor told the meeting that membership in CPA had increased to 380 (from 358) this year. This represents 97% of the oil and gas production in Canada.

Muskeg research by the association, in cooperation with the National Research Council, was outlined. It is hoped by oil men that better muskeg roads and muskeg travel will result from these studies.

W. D. C. Mackenzie, Imperial Oil Limited, and E. D. Loughney, The British-American Oil Co. Ltd., Toronto, were presented with honorary life membership scrolls in CPA at the fourth annual dinner. The presentations were made by the Honorable J. J. Bowlen, lieutenant-governor of Alberta.

Mr. Mackenzie was chairman of the association in 1954. In the same year Mr. Loughney was chairman of the Alberta Board of Directors.

Japan Builds Tanker for Canada

The first ocean-going supertanker ever built to serve a Canadian oil company was launched in Nagasaki, Japan, early in December. Built by Mitsubishi Shipbuilding and Engineering Co., the 35,500-ton "Imperial St. Lawrence" will carry crude oil from Venezuela to Imperial Oil Co.'s refinery at Halifax, N. S., and to Portland, Maine, for delivery by pipeline to Montreal.

Shell Refinery Appointment

J. L. Miller, superintendent operations at Shell Oil Co.'s Houston refinery, has been named manager of the Montreal refinery of Shell Oil Co. of Canada Ltd. He assumed his new post January 1, 1957. Mr. Miller succeeds L. T. Wilson, who has been given a special assignment.

Remote Control for Tankers Loading at Sea

The shallow coastal waters off Lutong refinery in Sarawak, British Borneo, require loading moorings 3½ miles offshore. Pipelines run from the shore to the four moorings.

A remote-control device, developed jointly by General Electric and Shell, enables the onshore loading pumps to be stopped immediately in an emergency by the pressing of a button on the panel of a control set on board the tanker. This device employs seven portable radio units, each fitted into a case for easy handling. Loud-hailing facilities a remote-control unit enable operation for a distance of 300 feet from the main instrument. The radio-telephone channel transmits in 80 megacycles, and pump control is on 80.2 mc's. The onshore RT transmits on 86 mc's, selective calling enabling operation on the "party line" principle.

New Offshore Recording Unit

A robot "Hurricane Inspector" is being built by Gulf Oil Corp., to measure the forces of waves, winds, tides, and currents in the open sea and in water depths over 100 feet.

Almost no exact data of this type exists and the complicated engineering mechanism has been created with the aim of learning the strength needed in offshore drilling platforms to protect the operating crews and equipment.

Two heavy-steel, water-tight boxes, one about the size of a small household refrigerator and the other slightly smaller make up the unit. The whole is self-operated by a battery continually re-charged by a wind generator. Moisture absorbers are included to keep the delicate instruments damp-free.

Shell Appointment

W. Catterson, formerly project engineer for Shell Oil Co. at its Montreal refinery, has been appointed assistant manager of topping and thermal cracking at Montreal. Mr. Catterson joined the company at Montreal in 1945.

Cities Service To Build Toronto Refinery

A $30 million expansion of Cities Service refining and marketing activities in Canada has been announced by W. Alton Jones, chairman. Major item will be construction, during 1957, of a 20,000 b/d refinery in the Toronto area, at a cost of approximately $22 million.

Simultaneously, Cities Service will undertake a multi-million dollar expansion of its marketing facilities in Ontario and Quebec. The marketing program embraces construction of new service stations, bulk plants, and other marketing facilities in the area, which is one of the fastest-growing in North America.

A third phase of the expansion is acceleration of Cities Service oil exploration and drilling activity in western Canada, principally in Alberta.

The Canadian development is an important step in a broad-scale Cities Service expansion program which is expected to require capital expenditures exceeding $750 million during the next 5 years. The program, most extensive in Cities Service history, embraces all phases of the oil and natural-gas business in the USA and several foreign countries.

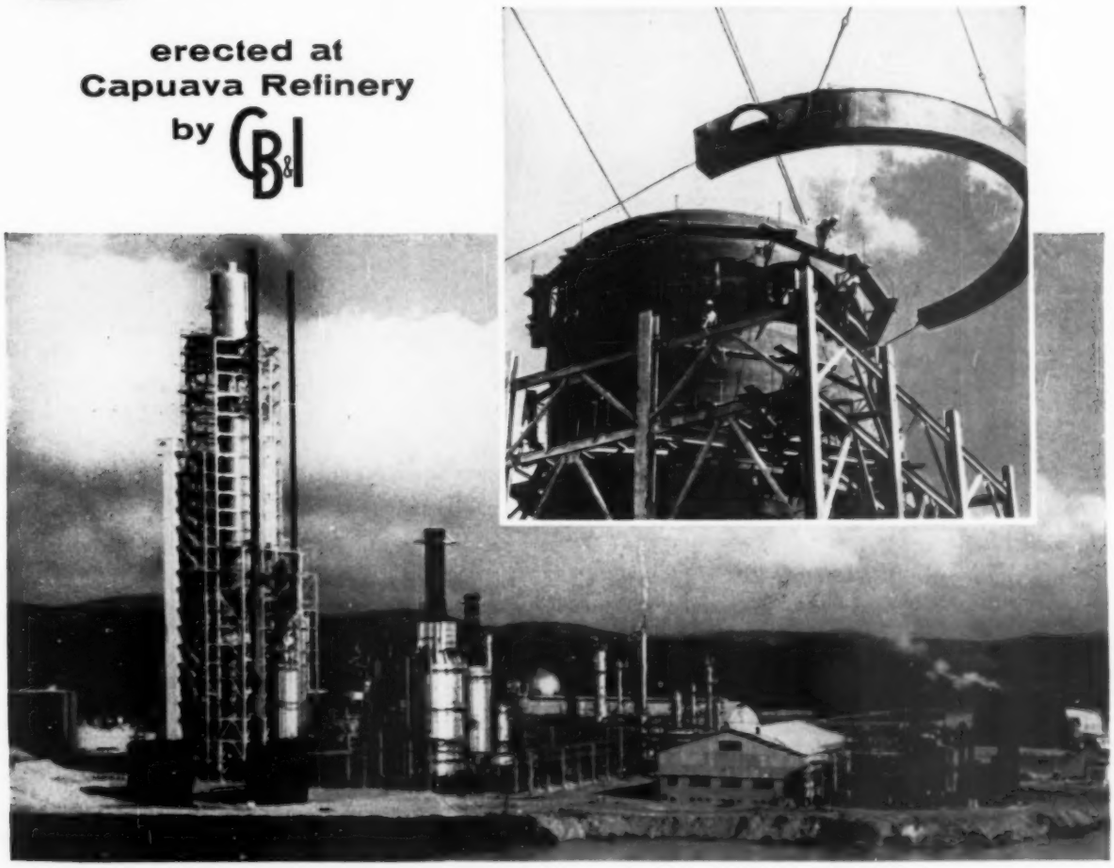
The Cities Service Canadian refinery is designed primarily to process western Canadian crude oil.

Location of the refinery in the Toronto area was determined by that area's ready access to growing markets, pipeline transportation from Canadian oil fields, and water transportation via the new St. Lawrence seaway. Engineering contractors are C. F. Braun Co. of Canada Ltd., Toronto.

Cities Service has been associated with Canadian development for 45 years, beginning in 1912 with with the acquisition of Dominion Natural Gas Co., which engages in the production and distribution of natural gas in Ontario. Cities Service Oil Co. Ltd. has marketed petroleum products in Ontario and Quebec since 1921, and will also operate the refinery. A third subsidiary of the Cities Service Co., Canada-Cities Service Petroleum Co., engages in oil exploration and production in western Canada.

1 ST TYPE 120 T.C.C. UNIT

erected at Capuava Refinery by CB&I



Top: An air duct section for the TCC kiln being raised into place.
Bottom: General view of Capuava Refinery.

• Fourteen miles north of Sao Paulo, Brazil, at Capuava, a main fractionating tower and the *first* type 120 Thermofor unit to be built was erected by Chicago Bridge & Iron Company in cooperation with their subsidiary, Sociedade Chibridge de Construcoes, Ltda. Both of the units were fabricated at our Greenville, Pa. plant and furnished through Hydrocarbon Research, Inc., New York, for Refinaria e Exploracao de Petroleo "UNIAO" S.A. The UNIAO refinery has a crude capacity in excess of 20,000 bbls. per day and can handle a wide variety of stocks.

• CB&I is a steel plate specialist—with *complete* facilities for designing, fabricating and erecting welded steel plate structures for the petroleum industry. Write our nearest office to take advantage of CB&I's experience and craftsmanship.

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REPRESENTATIVES AND LICENSEES:
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Latin American Oil News

Stanolind Increases Cuban Program

Cuba's hopes for 1957 being a big year—brightened with the announcement last month that Stanolind Oil and Gas Co. had increased its exploration commitment to $14,750,000 from the former $10 million by acquiring a second farmout from Cuban Venezuelan Oil Voting Trust and Trans-Cuban Oil Co. and started the first well of a three-year continuous drilling commitment.

The new farmout follows a year's exploration work during which Stanolind drilled no wells but spent more than $2 million in aerial photography, aerial-magnotometer, geological, and geophysical surveys.

Approximately 3,000,000 acres of land in the Cauto basin area of eastern Cuba have been added to the first farmout agreement which covered more than 11 million acres in Cuba's 3 large basin areas, including all of CVOVT and Trans-Cuba's offshore concession rights. Stanolind will earn a 50% working interest in all this acreage after fulfilling the commitments of the two farmouts.

The second farmout does not increase Stanolind's minimum spending rate commitment of $2 million a year, but it does increase the forfeiture payment to $1,475,000 from $1 million if the farmout agreements are terminated at the end of any one year. This, in itself, would seem to preclude any abandoning of the complete exploration program, for any company would take a long look at paying out in cash, to end an agreement, three-fourths of the amount of money for which it could continue another year's exploration. In this respect, the farmout is the most important exploration commitment made in Cuba to date, for it is an insurance policy that the largest exploration commitment in Cuba covering the largest amount of acreage will carry through a maximum oil-finding effort.

Almost simultaneously with the signing of the second farmout, Stanolind got its drilling program under way, with a deep test started on land near Guantanamo in eastern Cuba. An offshore test can be expected to start soon, as the majority of Stanolind's seismograph work during the past year has been on its offshore farmout acreage.

CVOVT and Trans-Cuba further benefited under the second farmout agreement by a provision for Stanolind to carry both companies for their share of costs in all exploitation wells to the extent of $1 million.

CVOVT and Trans-Cuba are now concentrating their exploration efforts on a joint exploration program with Cuban American Drilling and Exploration Co. on 750,000 acres in Cuba's central basin. Cuban American earned a 50% working interest in this acreage by drilling 45,000 ft of hole. The joint partners are currently drilling a deep test on the Catalina structure, 2 miles south of the Jatibonico oil field, where Cuban American found high-gravity oil—at 7,137 ft but were unable to make a commercial producer. This second test on the structure was drilling below 6,000 ft in December, and already had several shows of oil in upper horizons which the first deep test did not.

Additional proof that 1957 will be Cuba's biggest exploration drilling year to date was the announcement of a deep test scheduled to start late in December 1956, on a Gulf Oil Corp. farmout near Santa Clara, Las Villas province, central Cuba. An 8,000-ft test will be drilled by Consolidated Cuban Oil Corp. to earn a 50% working interest in a 25,000-acre block containing a seismograph structure. High-gravity oil was found in core holes drilled in the block. The prospect is of particular geological interest, as the geological speculation is that a limestone reservoir will be found under the serpentine of this area.

Adds Two Seismic Crews

Seismograph Service Corp., Tulsa, is moving two new seismic crews to South America, bringing its total to 11, plus 2 velocity logging units. The new contracts will move a fourth SSC crew into Brazil and a fifth seismic crew into Venezuela.

Dr. Alberto Diaz Masvidal

Plan Cuban Congress

An industry exhibit open to the public at large is planned as part of the overall activities of the Cuban Petroleum Congress, scheduled to be held in Havana, May 5-11, 1957. Dr. Alberto Diaz Masvidal is president of the organizing committee. The program committee is headed by Paul J. Griffiths, vice president and director of White Eagle International Oil Co. General offices for the congress have been opened in Edificio Habana 800, Havana, Cuba.

Gulf to Continue in British Honduras

British Honduras Gulf Oil Co., a subsidiary of Gulf Oil Corp., has announced it will continue exploration activities in British Honduras despite two recently drilled dry holes. The company will continue geological and photogeological work, as well as reviewing data obtained from the two test wells, before further exploratory drilling can be undertaken.

Crude Price Increase

Posted price of Venezuelan Boscan crude oil has been increased to $1.72 a barrel, effective December 1, 1956, by Richmond Exploration Co. The new price applies f.o.b. the deep-water loading terminal of the company at Bajo Grande, Venezuela. Boscan is a 10 API gravity crude, which is widely used throughout the world in the manufacture of asphalt. It is marketed, in behalf of Richmond Exploration, by California Crude Sales Co., another Standard of California subsidiary.

Panama Oil Exploration

Cataract Mining Corp. of New York and Time Petrofina SA of Panama, an affiliate of Time Petroleum Co. of Wichita, Kans., have concluded negotiations for exploration and development of Cataract's oil and gas concessions covering more than one million acres in the Province of Chiriqui in the republic of Panama.

Time Petrofina will spend $1 million for an initial exploration of the concession, involving aerial photometry, geological mapping, gravity meter surveys, seismic surveys, and paleontological interpretation.

Cataract's oil and gas concessions in Panama currently cover more than two million acres on both sides of the Panama Canal. Further announcement concerning drilling of balance of Cataract's acreage will follow shortly.

Acquires Venezuelan Concessions

Phillips Petroleum Co. has acquired the Venezuelan concessions of Pantepec Oil Co. CA, subject to certain reserved rights, and has taken over operation of these concessions consisting of approximately 32, 500 acres which currently produce over 5,500 b/d of crude oil from about 150 wells. The properties are in the Mulata and El Roble fields of eastern Venezuela, and are close to other Phillips production and to Phillips gas-processing facilities. This enables Phillips to take immediate steps to increase production by opening up previously shut-in Pantepec wells. In addition, Phillips acquired Pantepec's one-half interest in a natural-gasoline and crude-stabilization plant in the Mulata field.

Cuban Discovery

Consolidated Cuban Petroleum Co. announced it had again struck oil at approximately 1,000 ft in its Cruz Verde No. 4 well. It is as yet difficult to anticipate the rate of production.

Once completed, this will be the company's sixth producing well in the Bacaranuo Cruz Verde field.

Consolidated Cuban, with its two subsidiaries, Petroleo Cruz Verde SA and Cuban Land Oil Co. SA, produce about 40% of all Cuban oil output. Since August 1956 it has had a working agreement with Esso Standard Oil Co. (N.J.)

IOMC Obtains Panama Royalty Interest

International Oil and Metals Corp. has obtained an approximate 2% overriding royalty interest in a new 700,000-acre concession in Panama. The interest will be earned as part of its price for drilling a qualifying well for the holders of the master concession. International's portable drilling rig and equipment have been in Panama since late last summer for exploratory operations on its own properties.

Part of the new concession is in the Province of Bocas del Toro, where Union Oil Co. is now drilling in a follow-up to its 1,000 b/d discovery well across the border in Costa Rica.

International already has a 90% interest in another 700,000-acre concession, partly in Bocas del Toro province and an operating agreement on a consession of approximately 1,165,000 acres in Darien province.

To Map Cuba

The Cuban government signed a contract in Havana, November 28, for the air-mapping of the entire island. The survey began in November, and will require two years to complete. It will cost $1,100,000. Aero Service Corp., Philadelphia, will perform the survey.

The aerial survey, covering approximately 45,000 square miles, will make Cuba the first country in the Western Hemisphere to have such complete, detailed map coverage for all of its land. Scale of the new maps will be 1 to 50,000—with a 10-meter contour interval.

Expanded Brazilian Program

Colonel Nunes, Petrobras head, expects Bahia crude production to reach 40,000 b/d in 1957. According to Petrobras' revised program, between 1957-61 crude production is to be raised to 130,000 b/d, refining capacity to 270,000 b/d, including that of private refineries, and the tanker fleet to 500,000 tons dwt. The cost is estimated at 35,500 million cruzeiros, inclusive of $307 million for imported equipment.

In October, Petrobras called for preliminary tenders for engineering services, materials and equipment for a 90,000 b/d refinery, to be installed in, or near, Rio de Janeiro. Planned output (in b/d LPGas 1,300; gasoline, 22,500; premium gasoline, 2,500; kerosine, 14,000; diesel oil, 16,400; fuel oil, 26,300. Power plant, 22,500 k/s. Two other refineries will be built, with a joint processing capacity of at least 80,000 bpd, one in Northeast Brazil, the other at Corumba, Mato Grosso, according to a Bill now before Congress.

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London Letter

By E. Lawson Lomax

Emergency committees of the Oil Emergency (London) Advisory Committee have set up headquarters in London. They comprise representatives of British Petroleum Co. Ltd., Royal Dutch-Shell group, and the Compagnie Française des Pétroles. Chairman of the committee is B. R. Jackson, (BP chairman). Royal Dutch-Shell group is represented by J. A. Loudon; and CFP by M. V. de Metz. The secretary is J. P. Berkin, Shell Petroleum Co. Ltd.

This committee was set up sometime ago to study and give advice on oil-supply problems which might arise from the Suez Canal emergency. If required, it was also to assist governments in the implementation of any plans made to achieve the optimum of available supplies and tanker tonnage. OELAC will collect information from industry sources, and will assist governments or oil companies by providing information as to the developing supply situation. It will not have any operational functions.

As in the past, individual oil companies will be responsible for tackling the problems involved in providing Europe, including the UK, with essential supplies of oil.

At the request of the government, an Oil Industry Emergency Committee has been formed to assist the Ministry of Fuel and Power in dealing with the problems arising from the applications of the measures to reduce consumption of petroleum products in the United Kingdom. The committee consists of representatives of companies engaged in the distribution of petroleum products in the UK.

C. M. Vignoles (Shell-Mex and BP) is chairman, and the other members include Sir Leonard Sinclair, Esso Petroleum Co.; C. M. Merrick, Fina Petroleum Products; H. W. Rocke, Mobil Oil Co.; H. H. Bates, National Benzol Co.; R. W. Ball, Regent Oil Co.; and G. C. Hick to represent other companies. H. E. Barry (Shell-Mex and BP Ltd.) is secretary.

Oil Industries Club

The 20th annual dinner of the Oil Industries Club was held at Grosvenor House, November 16, 1956, under the presidency of L. W. Berry. Principal speaker was Sir Miles Thomas, DFC, chairman of Monsanto Chemicals Ltd., and Forth Chemicals Ltd., who proposed the toast of the club, responded to by Mr. Berry, who also proposed the toast of the guests which was responded to by Major General Sir Edward L. Spears.

New Engine-Test Laboratory

A new motor-fuels engine-test laboratory at the Sunbury-on-Thames research station of British Petroleum Co. Ltd. was officially opened by Aubrey Jones, Minister of Fuel and Power, November 2, 1956.

This laboratory is a major item in the current program of expansion at Sunbury, which program also includes a new analytical and physics laboratory, a workshop, a new restaurant, and other ancillary buildings; these will be followed by further facilities now in the planning stage—the total cost of the whole expansion being estimated at £3 million.

Forth Chemicals Ltd., Grangemouth

Forth Chemicals Ltd. officially opened its enlarged styrene monomer plant, November 7, 1956. Capacity of the plant is now 30,000 tons per year.

Butadiene Extraction Plant Completed

Head Wrightson Processes Ltd. has announced that the butadiene extraction plant engineered license from Phillips Petroleum Co. and built for Imperial Chemical Industries Ltd., at Wilton, has been completed. The main outlet for butadiene is the range of copolymers marketed by ICI under the trade name of "Butakon."

Petroleum Rationing in UK

Minister of Fuel and Power Aubrey Jones announced, November 20, that he would introduce a system of oil rationing to take effect December 17. A probable shortfall of 25% in UK oil supplies was to be the basis for restrictions. At the time of the announcement, imports of crude were about 40% below normal, but there was a prospect of inshipments being greater with the arrival of tankers voyaging around the Cape of Good Hope and also of new supplies from the Western Hemisphere.

Motor gasoline: For goods vehicles, the basic ration will be two gallons per half-ton unladen weight. This amounts to about half the normal consumption. A further 25% will be reserved for use as supplementary rations where need can be shown. For private vehicles, the basic ration will be equivalent to 200 miles running per month.

For diesel-driven vehicles, the basic ration will be enough to cover approximately the same mileage as gasoline-driven vehicles. This amounts to about one-third of normal consumption. A further 40% will be reserved for use as supplementary rations where need can be shown.

For industry, the present cut of 10% in gas-diesel oil was to be increased to 20% January 1, 1957.

Central heating: Nonindustrial central heating was cut to 33% on gas-diesel oil, and 25% on fuel oil, from December 1, 1956.

Fuel consumption for passenger transport was to be reduced by 10%, the cuts varying according to type of service. A 10% cut also was ordered in the use of diesel oil for agriculture and for fishing vessels.

Recently, the Ministry of Fuels and Power fixed the amounts of supplementary gasoline it can grant to those using cars for business and professional purposes. These, over the 4-month ration period, amount to 10 gal for cars up to 7-hp, 12 gal for cars up to 8- to 9-hp, 16 gal for cars 10- to 13-hp, 20 gal for cars 14- to 19-hp, and 24 gal for 20-hp and above.

Roughly, these amounts are equivalent to an extra mileage of 100 per month for those whose living depends on the use of a car or some form of transport which, in the majority of cases, is not available or, if available, is either too slow, the service too infrequent—or is not direct.

Announcement of rationing at least four weeks before the actual date caused a rush of motorists to the petrol stations which have run out of supplies as a result.

British oil companies are already active in the search for available oil in the Western Hemisphere to increase the amount available for refining, as some US refineries are now running at a 25% reduced throughput.

Apart from this shortage affecting the oil industry and the individual consumers, evidence points to a large amount of unemployment, spread over the various industries in the country, in the near future. This could have been avoided if the Suez Canal had been kept open, as the British and French wished.

Whatever may be the feeling in the rest of Europe, it is very strong in the UK about accepting aid from any external source—the general tendency of feeling being that France and the UK took the right action with regard to the Suez Canal, and are prepared to stand by it, sink or swim.

The sense of responsibility for commitments is strong with the British oil companies, and one does not expect to see them deny these responsibilities; so great efforts will be made by them to fulfill these commitments in whatever part of Europe they are located, even at a monetary loss.

The Chancellor of the Exchequer stated in the House of Commons, November 27, that the rationing of petroleum would mean a loss of revenue to the treasury equal to about $17 million per month.

The first cargo of oil to be brought around the cape since the blocking of the Suez Canal arrived at Kent refinery, November 28, being carried in the "Athina Livanos."

New Oil-Equipment Record

According to figures compiled by Oil Companies Materials Secretariat and published by the Council of British Manufacturers of Petroleum Equipment, orders for oil equipment and materials received by British firms for the first nine months of 1956 set a new record. The amount is £114,171,048.

Observers on board the SS "Seislim" examine a shot record during a marine survey off the UK coast. (BP photograph)

Marine Survey Off UK Coast

The first water-borne geophysical survey to be carried out by the British Petroleum Co. off the coast of Britain took place recently off Swanage and Lulworth Cove. It was conducted from the 1,000-ton converted corvette "Seislim," the first British-owned vessel to be especially equipped for this work.

Shell Haven Alkylate Plant

Shell's new detergent alkylate plant at Shell Haven has an annual production of some 30,000 tons of quality alkylate, which is made by the reactions between olefins and benzene in the presence of a strongly acidic catalyst. The new plant was designed by the Royal Dutch-Shell group, and construction was carried out by Foster Wheeler Ltd., London.

Personnel

Geoffrey Sims-Davis, who was district engineer, Lancashire, for British Oxygen Gases Ltd., has been appointed equipment manager.

Robert Fannon, formerly superintendent of the process development section at Cricklewood, has been appointed assistant to Sims-Davis.

G. C. Carr, who has retired from Shell Petroleum, is continuing his association with the petroleum industry in a consulting capacity.

Company Reports

British Petroleum Co. Ltd. has announced that 75% of the holders of the ordinary stock of Trinidad Petroleum Co. Ltd. have accepted the BP purchase offer, and the purchase is now unconditional.

The directors of Kern Oil Co. Ltd. recommended a dividend, for the year ended May 31, 1956, of 17½% and a bonus of 7½%, total 12 pence per stock unit of 4 shillings, less income tax at 8s 6d in the pound, absorbing a net amount of £173,039. Net profit for the year was £342,217. The general reserve has been increased to £1 million.

Shell-Mex and BP offered to purchase the National Benzole holdings for the motor-fuel and lubricants trade carried on by the National Benzole Co.

This company was first formed after the first world war to collect benzols made by various companies in the UK for sale, after blending with petroleum spirits, as motor gasoline, under the blend name of "National Benzol Mixture." For many years Shell-Mex and BP have provided the necessary petroleum spirit.

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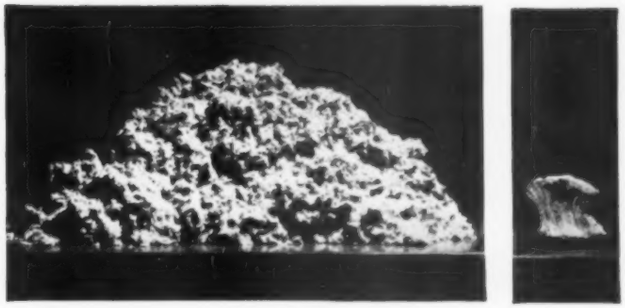

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EFFICIENCY DATA SHEET—PIPE SIZES 6" to 10" BORE.

HOT FACE TEMPERATURE °F.			400° F			600° F			800° F		
THERMAL CONDUCTIVITY K = B.Th.U. in. sq. ft. hr. in. °F.			0.43			0.47			0.53		
MEAN TEMPERATURE °F.			250			350			450		
Nominal Pipe Size	O.D. pipe	Thickness of Insulation	Heat Loss B.Th.U. sq. ft. hr.	Effic. %	Surface Temp. °F.	Heat Loss B.Th.U. sq. ft. hr.	Effic. %	Surface Temp. °F.	Heat Loss B.Th.U. sq. ft. hr.	Effic. %	Surface Temp. °F.
6"	6¼"	1"	135	87·7	126	233	90·6	167	354	92·5	218
		1½"	102	90·8	107	177	92·9	135	270	94·3	171
		2"	83·6	92·4	97	145	94·1	118	223	95·3	145
		2½"	71·8	93·5	91	125	95·0	107	192	96·0	128
		3"	63·5	94·2	86	110	95·5	100	170	96·4	117
		3½"	57·3	94·8	83	100	96·0	95	154	96·7	109
		4"	52·6	95·2	81	91·7	96·3	91	142	97·0	103
8"	8⅝"	1"	130	88·0	127	225	90·8	169	341	92·7	222
		1½"	97·7	91·0	108	169	93·1	137	258	94·5	174
		2"	79·2	92·7	98	138	94·4	120	211	95·5	148
		2½"	67·4	93·8	92	117	95·2	109	180	96·1	131
		3"	59·2	94·6	87	103	95·8	102	159	96·6	120
		3½"	53·2	95·1	84	92·7	96·2	96	143	96·9	111
		4"	48·5	95·6	82	84·6	96·5	92	131	97·2	105

These figures are compiled from results of official tests by THE NATIONAL PHYSICAL LABORATORY, TEDDINGTON, computed in accordance with formulae shown in BRITISH STANDARD SPECIFICATION appendices

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In the 12th century Al-Khazini, an Arab, conducted experiments with a crude hydrostatic balance and recorded his findings on the phenomena of gravity in the *Book of the Balance of Wisdom.* His theorems as translated and recapitulated are in part:

1. When a body moves in a liquid, one interferes with the other; and therefore water interferes with the body of any thing heavy which is plunged into it, and impairs its force and its gravity, in proportion to its body . . . this interference, in the case of the balance of wisdom, is called the rising up of the beam.
2. When a body is weighed in air, and afterwards in the water-bowl, the beam of the balance rises, in proportion to the weight of the water which is equal in volume to the body weighed; and therefore, when the counterpoises are proportionally lessened, the beam is brought to an equilibrium, parallel with the plane of the horizon.

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ISOMERIZATION OF PENTANE-HEXANE FRACTION FROM COMMERCIAL STOCKS

	KUWAIT		MID-CONTINENT		NAT. GASOLINE	
	Feed	Product	Feed	Product	Feed	Product
TOTAL C_5-C_6						
Vol. %	100.0	97.3	100.0	96.7	100.0	99.2
Octane CFRR-Clear	63.7	77.7	62.1	77.0	72.3	83.3
+3 cc TEL	88.3	96.2	87.3	95.8	93.9	99.8
PENTANE FRACTION						
Vol. %	45.0	45.0	34.5	34.5	58.5	58.5
Octane CFRR-Clear	74.4	91.0	72.9	91.0	79.2	91.0
+3 cc TEL	95.8	104.9	94.9	104.9	98.4	104.9
HEXANE FRACTION						
Vol. %	55.0	52.3	65.5	62.2	41.5	40.7
Octane CFRR-Clear	54.9	66.3	56.4	69.2	62.6	72.2
+3 cc TEL	82.2	88.7	83.3	90.7	87.5	92.4

KEL

by M.W. KELLOGG

ISO-KEL is a new process developed by The M. W. Kellogg Company for isomerizing light naphthas. Designed to help refiners increase their high octane pool, ISO-KEL can upgrade combined streams of pentane and hexane fractions as well as natural gasoline.

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The advantages of this new ISO-KEL process rest on a new, precious metal catalyst (not platinum) developed by M. W. Kellogg's research laboratories. This vapor-phase process requires only one reactor—which operates in the presence of hydrogen. Operating conditions are less severe than those for reforming heavy naphtha.

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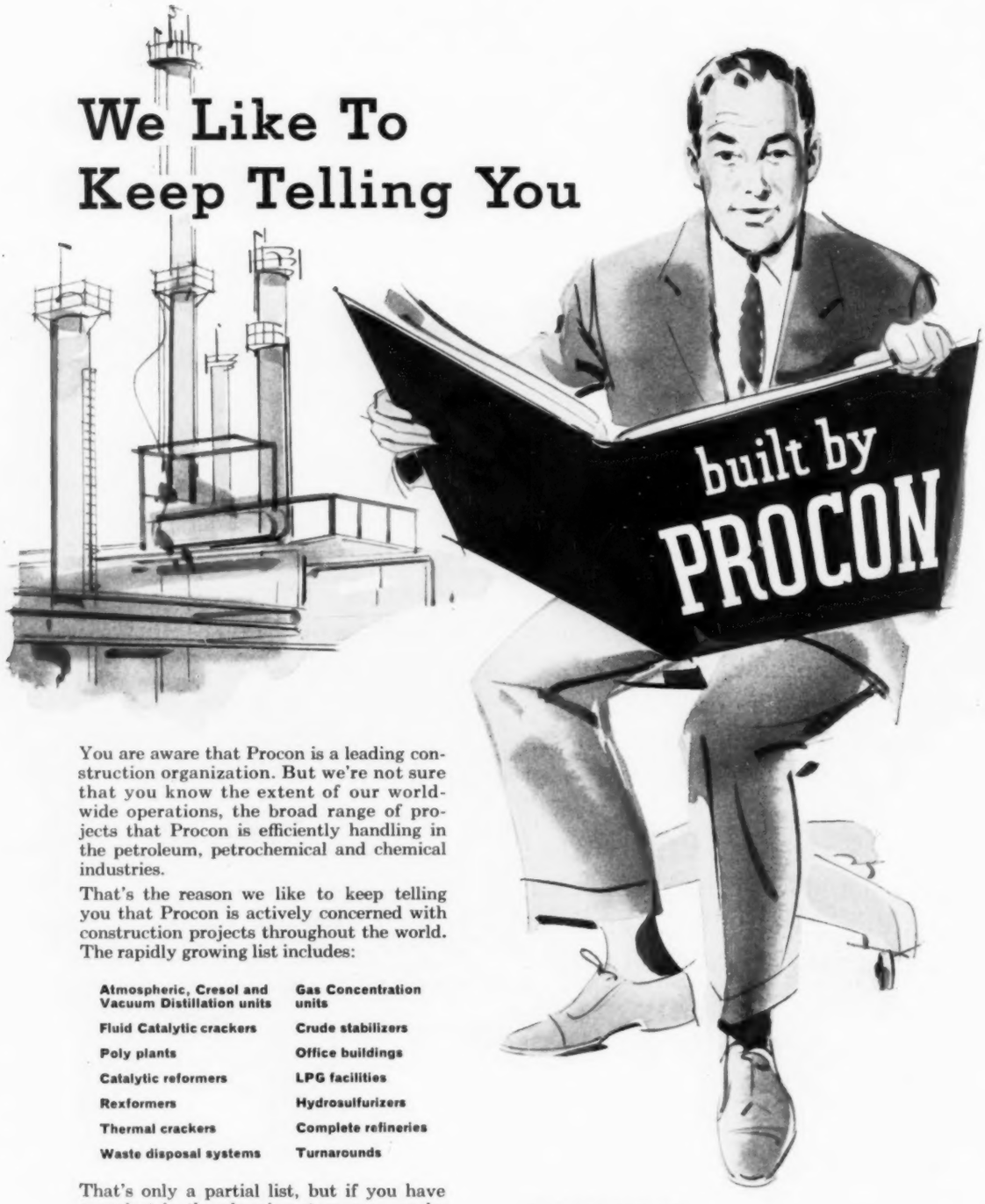

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DU PONT *Petroleum Chemicals* NEWS

One of a Series of Bulletins for the Petroleum Industry

JANUARY 1957

New Du Pont presentation will inform public on oil industry

DU PONT VICE-PRESIDENT

JOHN F. DALEY, a director of the American Petroleum Institute and a member of the Institute's General Committee, Division of Refining, was recently appointed a vice-president of the Du Pont Company.

Mr. Daley joined the Du Pont Company in 1915 as a timekeeper in the explosives plant at Carney's Point.

When made a vice-president he also became a member of the executive committee and director of Du Pont. Prior to holding these positions, Mr. Daley was general manager of the Organic Chemicals Department, which includes the Petroleum Chemicals Division.

In 1940, Mr. Daley's experience in explosives manufacture was made available to the government. During the war, he served as manager of the Indiana Ordnance Works and as deputy field director of ammunition plants, with jurisdiction over 55 government-owned plants. For this work, he was awarded a commendation for exceptional civilian service by the Secretary of War.

He returned to Du Pont as director of pigments sales in 1944, later becoming general manager of the Pigments Department. He was appointed general manager of the Organic Chemicals Department in 1948.

A clear, concise—yet highly dramatic—explanation of our American business system is packed in the small, lightweight briefcase pictured below. It's a presentation kit with a story woven closely around oil industry products and activities. Tentatively, it has been named "A 'Brief' Case for Business."

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The briefcase is not meant to replace the "Magic Barrel," which will be continued. Rather it is to supplement that program. It can be presented to groups who have already seen the Barrel, or where the Barrel is for some reason not feasible or appropriate. The new presentation has been streamlined, including fewer items than the Barrel. These items, however, have been carefully selected to tell the story forcefully.

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OVER

DUPONT *Petroleum Chemicals* NEWS

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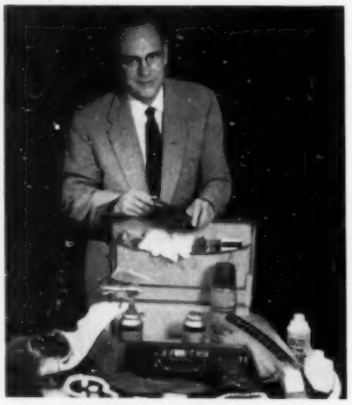

H. C. THOMPSON, assistant promotion manager, demonstrates.

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Planned and produced by the Du Pont Petroleum Chemicals Division, the film is sponsored and distributed by the American Petroleum Institute, Independent Petroleum Association of America, Mid-Continent Oil and Gas Association, Rocky Mountain Oil and Gas Association and Western Oil and Gas Association.

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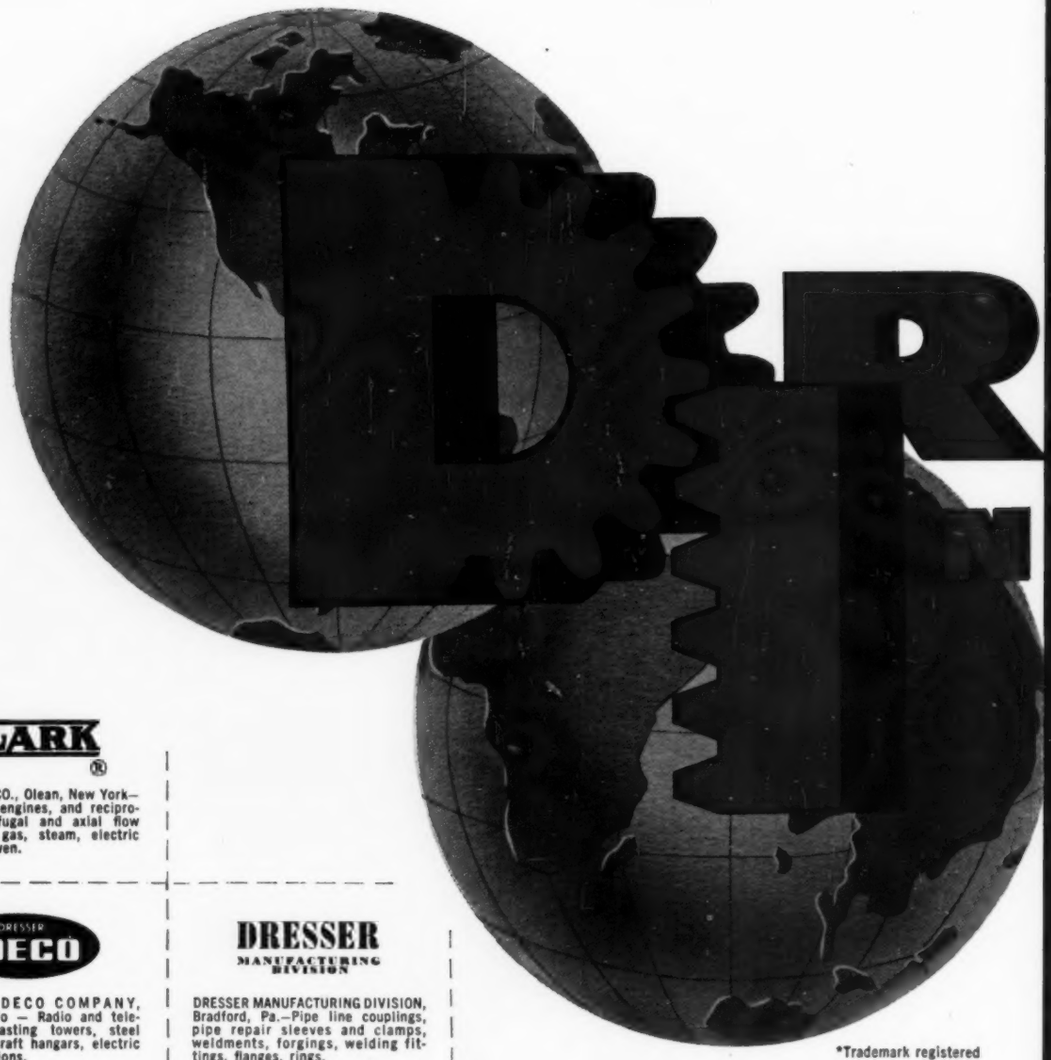

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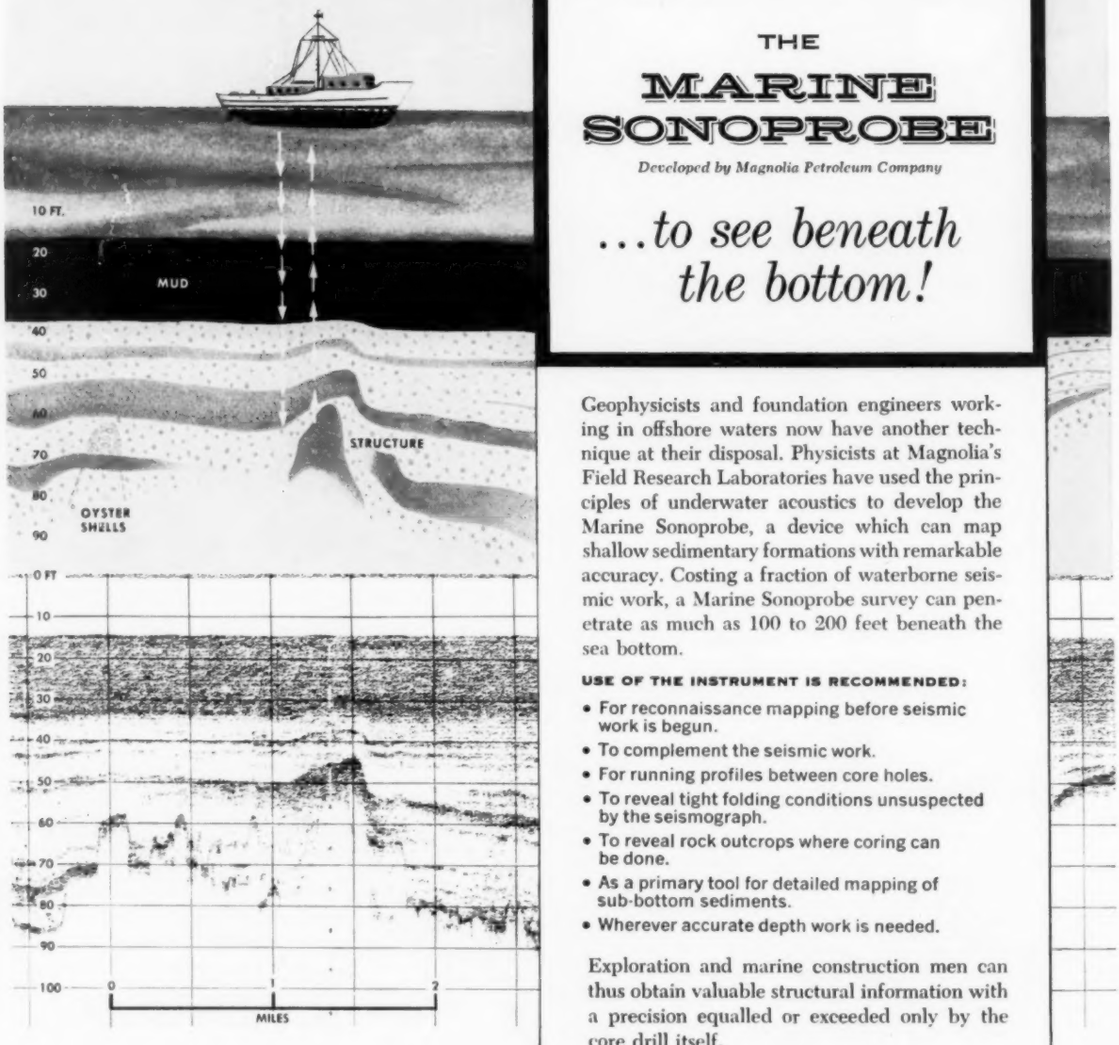

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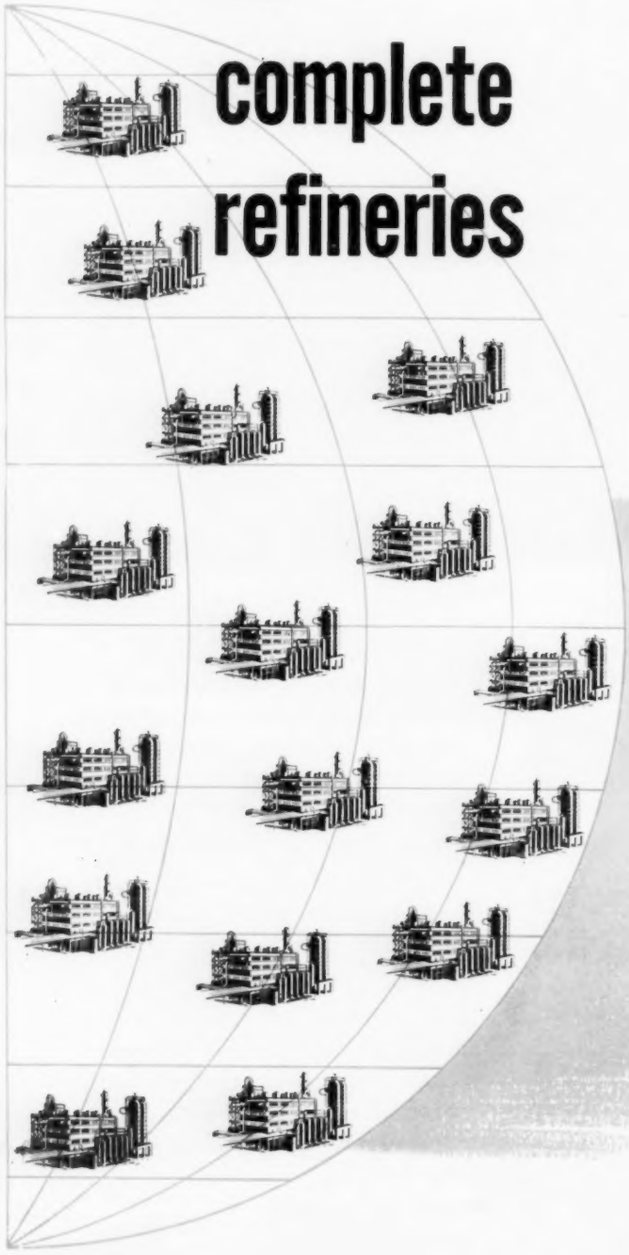

1945

1. Refinery for B. P. M. at Cardon, Venezuela.
2. Refinery for Koppartrans Oljeaktiebolag at Gothenburg, Sweden.
3. Refinery for Venezuela Gulf Refining Company at Puerto La Cruz, Venezuela.
4. Refinery for Societe Generale des Huile, de Petrole at Dunkirk, France.
5. "Portable" refinery for U. S. Navy Department.
6. Lube oil refinery for Cit-Con Oil Corporation at Lake Charles, Louisiana.
7. Refinery for International Refineries Inc. at Wrenshall, Minnesota.
8. Refinery for Vacuum Oil Company Ltd. at Coryton, England.
9. Refinery for Burmah-Shell Oil Company at Bombay, India.
10. Refinery for Standard-Vacuum Oil Company at Bombay, India.
11. Refinery for Standard Oil Company (Indiana) at Mandan, North Dakota.
12. Refinery for Suntide Refining Company at Corpus Christi, Texas.
13. Refinery for Commonwealth Refining Company at Ponce, Puerto Rico.
14. Refinery for Esso Standard Oil Company at Antwerp, Belgium.
15. Refinery for Caltex at Visakhapatnam, India.
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VOL. 28, NO. 1 JANUARY, 1957

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THIS MONTH'S COVER

Station 9 at Victoria, Texas, on Tennessee Gas Transmission Company's main line is an example of good industrial housekeeping. The shine on the floor and polish on the engines reflects the pride of employees in their plant. Color plates reproduced through the courtesy of Macon Freeman, editor of *The Line*, house magazine of Tennessee Gas Transmission Co.

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Of Advantage To All—A Permanent Settlement

THE year 1956 which opened so bravely, with such fine prospects for the petroleum industry, has closed in turmoil. The people of Western Europe are cold. Factories are closing. The whole economy has suffered a grievous hurt.

In the Middle East, the Arab world is suffering in a similar manner. Half of the State revenues have disappeared. Many months must elapse before crude production in Iraq and on the Persian Gulf can be restored to a pre-Suez normal and royalties again flow freely into Arab treasuries.

Before the seizure of Suez, oil consumption in the Eastern Hemisphere was running about 11% higher than in 1955. The rise in demand was more than double that enjoyed in the USA. For 1957, it was estimated US oil utilization would rise about 4%, whereas in the Eastern Hemisphere an additional increase of 8.5% was anticipated. European supplies are cut to 80% of normal for the present, and markets in the Far East and Australasia doubtless may feel the pinch to some extent, even though little or no oil for the area normally moves through Suez.

There is plenty of oil in sight to supply European markets without Suez or the IPC pipeline. As has been the case in every recent pinch, the only difficulty has been a lack of transportation. With more tankers and more pipeline capacity in Venezuela and the US Mid Continent, no shortage would exist today.

Now that political differences between Britain, France, and the USA have been at least patched up, the industry will have a chance to show what it can do. During World War II the industry had an amusing slogan which suggested that very difficult jobs were done immediately while the impossible took a bit longer. Supplying European oil markets is not impossible. The job will be taken care of as it was when Iran nationalized its oil and shut off supplies to Europe and Asia.

With an emergency committee at work on the problem in London and a similar committee in the United States given government permission to pool ships and supplies, the world is likely to see a much more rapid improvement in shipping than had been visualized in the balance sheet given elsewhere in this issue. Radio messages have gone out to tanker masters changing sailing orders. Oil earmarked for the West is moving to Europe.

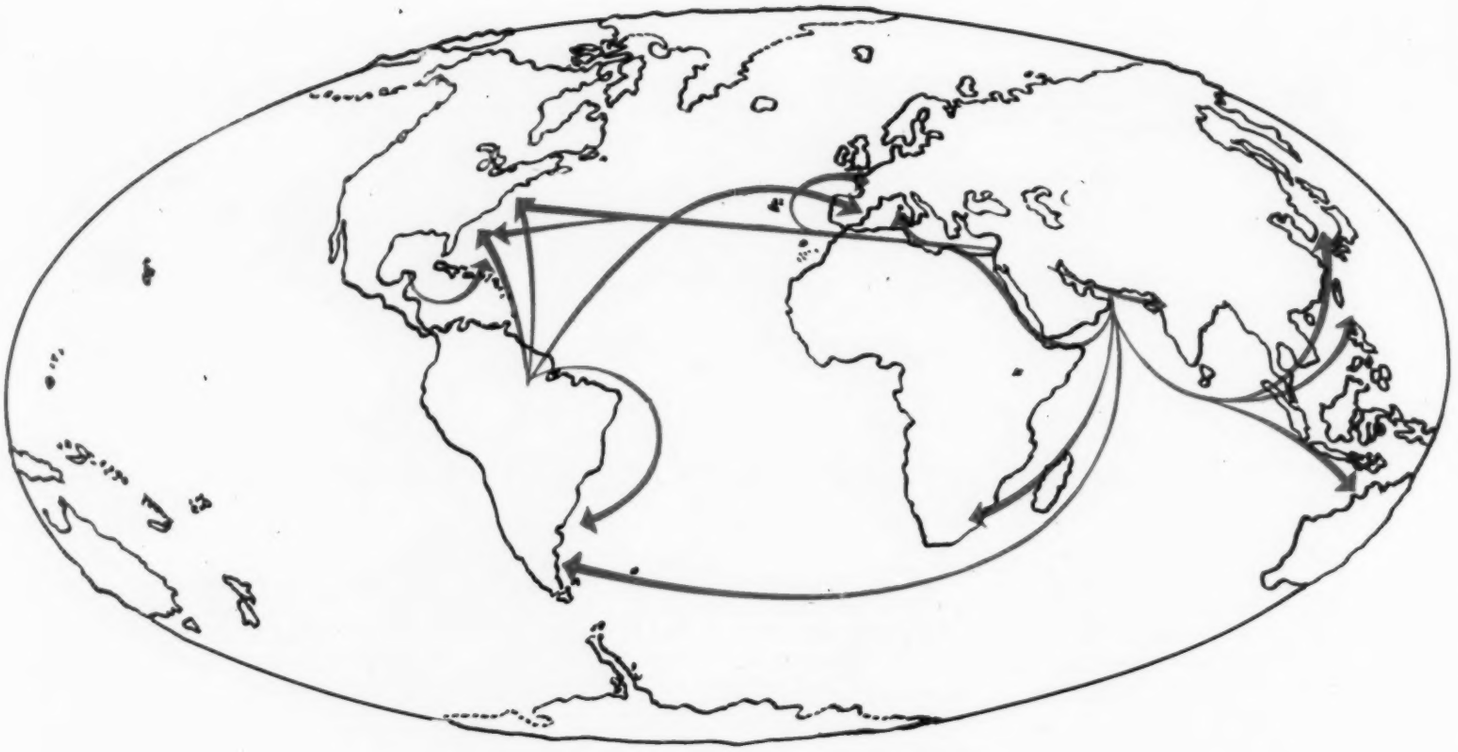
Egyptian authorities now seem willing to permit canal obstructions to be cleared. The British Admiralty has offered a plan and equipment. Other marine salvage equipment and personnel are being assembled as this is written. Clearing a channel, at least for southbound unladen tankers, will aid in speeding Persian Gulf shipping. If Syria also will permit Iraq Petroleum Co. to repair its lines and bypass its sabotaged pump stations, another large increment can be added to the European supply.

It is clear from events of the past two months that a prime requisite for restoration of international trade is a genuine settlement of Middle East political problems. Before Iraq oil can flow to market again, the Iraq government must settle its differences with Syria. All of the lands over and through which oil must flow to Europe must see that a *modus vivendi* is essential if their people are to share in the wealth which oil brings to mankind.

If a permanent settlement is not reached, the people of the Middle East will suffer through a delay or stoppage of the improvement in their standard of living. Without a settlement, the oil industry will be forced to develop alternate supply sources and alternate lines of movement.

Without assurance of free movement through Suez, the industry will resort to low-cost supertankers capable of rounding the Cape of Good Hope without undue hardship. Without agreement on pipeline payments to Syria and Lebanon, and without property protection, the industry will lay alternate lines through Turkey. Without a settlement, the industry will diligently pursue its search for "big" oil in Africa and perhaps seriously limit the future market for Middle East oil over a long period of years.

In their own interest, the nations of the Middle East need to settle their differences and offer assurances of a favorable business climate for foreign capital. Otherwise capital will seek employment elsewhere, where property rights and the sanctity of contracts are recognized. Money is tight today, and the competition for capital is keen. Money need not be placed in jeopardy in areas where nationalization is a continuing threat to stable business and industrial undertakings. END



Principal Intercontinental Crude Movements Before Suez Shutdown

EMERGENCY COMMITTEE ACTS TO MEET OIL NEED OF EUROPE

by Joseph Huttlinger

THE world oil industry is going through one of its great dramas today as it meets the oil transportation shortage growing out of the Middle Eastern crisis. Following preliminary meetings, it appears that the United States government and the American petroleum industry have laid plans which indicate the free world can get along adequately, but with Europe on short rations, even with the Suez Canal and the Iraq Petroleum Co. pipelines shut down.

All plans at this time have been made on the basis that the situation will not get worse and that the Trans-Arabian pipeline will continue to operate. One school of thought holds that the free world could meet even that kind of disaster without utter catastrophe.

To meet the emergency, Western Hemisphere producers aim at raising crude output by 850,000 b/d, to a new record, to make up part of the Middle East deficit. Until that increase can be attained, stocks of crude oil and products will be drawn down. This reduction is no disaster, since inventories have been too high in recent months.

Prices, which were weak only two months ago, are firming up. A sizeable jump is foreseen by many in the United States, in line with price hikes in Europe and stepped-up demand.

The US Military Petroleum Advisory Board is taking steps to move the most crude oil to Gulf ports for shipment to Europe. This is no easy task, since lines from West Texas and other Mid Continent fields have been operating at near capacity. Even so, throughput is being increased and supplemented by barge movements down the Mississippi.

The pipeline shortage is not confined to the United States. Venezuela, second largest producer in the Western Hemisphere, is said to have a shut-in crude producing capacity of about 750,000 b/d in addition to its current output of 2,500,000 b/d. It is not possible to get this extra three-quarters of a million barrels moving toward Europe, however, because there is not enough pipeline capacity. Currently, the Middle East Emergency Committee calculates that it can move only about 50,000 b/d more oil out of Venezuela.

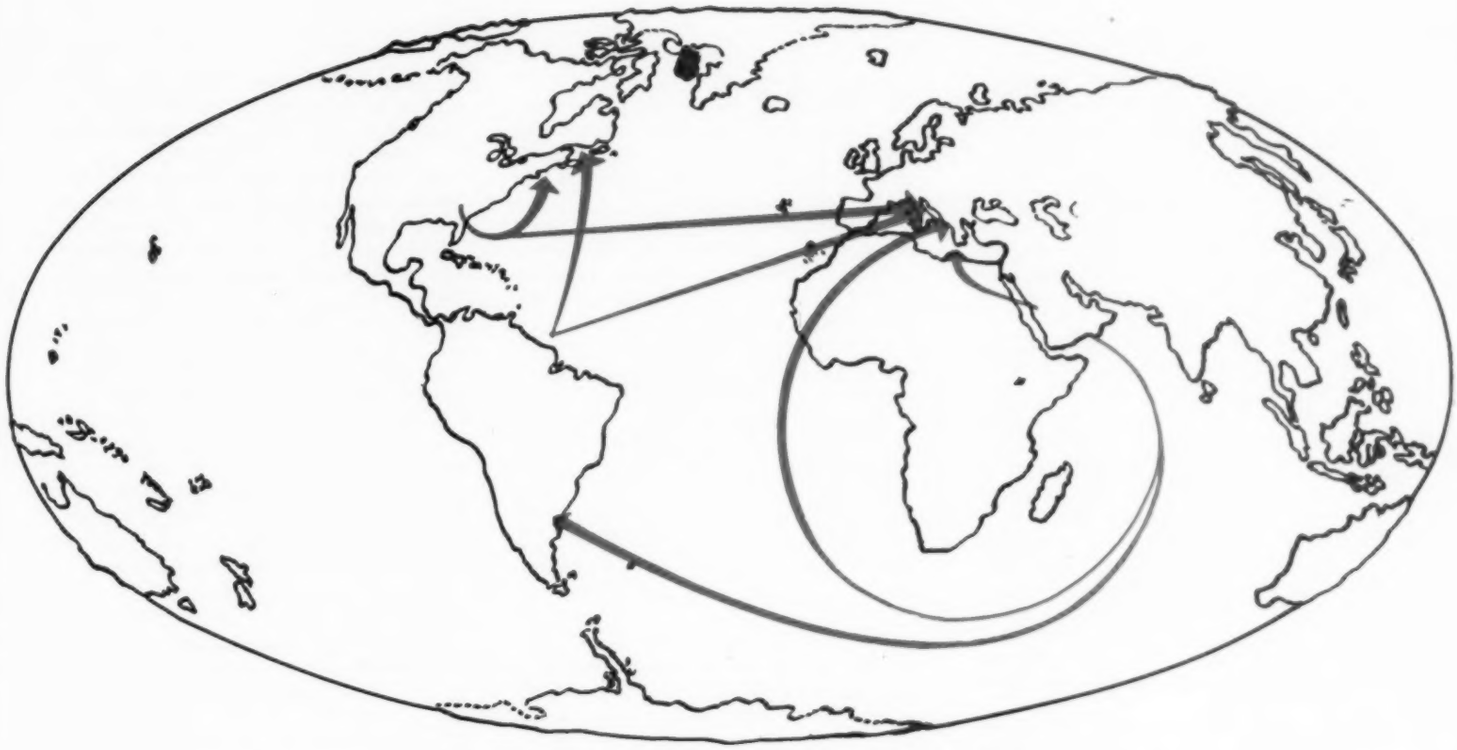
The Middle East Emergency Committee, with 15 US oil companies as members, is taking the lead in a world tanker pool to ship the most oil to Europe at the lowest possible cost.

MEEC also is arranging exchanges of crude oil, products, and blending agents with oil companies over the world, swapping use of storage facilities, changing rates of production and refinery runs.

US antitrust laws have been waived for the effort, permitting competitors to act in concert.

Following initial meetings of the emergency committee Felix E. Wormser, assistant secretary of the interior, announced approval of two schedules designed to make more efficient use of tankers. Under Schedule No. 1 major diversions contemplated are as follows:

1. Oil usually shipped to the US East



New or Enlarged Crude Movements Planned by Emergency Committee

Coast and Canada from the Persian Gulf will be diverted to Europe and to points east of Suez.

2. Oil from the Trans Arabian pipeline will move to the Mediterranean area in Europe exclusively instead of to western Europe the U.S. and Canada.

Under schedule No. 2 major changes proposed are as follows:

1. Oil, formerly shipped from the Caribbean to South America will move to Europe and be replaced by oil from the Persian Gulf.

2. Tankers will move from Europe to the Caribbean in ballast, pick up a cargo of crude for Latin America and subsequently move in ballast to the Persian Gulf thus creating a circle movement.

3. Increase movement of U.S. Gulf Coast oil to the U.S. East Coast and to Canada.

Normal intercontinental movement of crude and the new or enlarged movements as approved are suggested in two accompanying maps.

The oil and gas office of the Interior Department is taking on more manpower for the emergency. J. Ed Warren, vice president of the First National City Bank of New York (former deputy petroleum administrator) will advise Interior Secretary Seaton on oil matters.

US military officers have been reviewing their oil supply-demand picture, and aiming at a larger budget in January in the wake of the crisis.

Fuel-oil and gasoline rationing plans are being kept up to date in the United States, but officials are emphatic they won't be used. The same for price controls. In Europe, rationing and price controls are coming on in many countries.

The problem of crude-oil imports, once

TIMETABLE OF MIDDLE EAST OIL CRISIS

JULY President Nasser of Egypt seizes Suez Canal shortly after USA refuses him a loan for Aswan dam. President Nasser orders pilots to stay on the job, and promises to keep the canal open, and to pay off Suez Canal Co. through canal earnings.

AUGUST Foreign Petroleum Supply Committee of US oil companies meets on Suez crisis under eye of US government. FPSC creates Middle East Emergency Committee, with government approval.

SEPTEMBER Users' association of British, French, US, and other nationals is set up to collect its own tolls for use of the Suez Canal and to use its own pilots.

Secretary of State Dulles says USA is ready to give a half-billion Export-Import Bank loan to European countries to buy US crude oil if the users' association is barred use of the canal on its terms.

Officials of US crude-oil producing states, and US government say US reserve oil-producing capacity is 2,250,000 b/d. States' officials say the reserve includes Texas, 1,067,000 b/d; New Mexico, 50,000; Louisiana, 300,000; and Oklahoma, 125,000.

OCTOBER President Eisenhower asks studies looking toward 50 new tankers up to 60,000 tons, each at a cost of about $1 billion. Office of Defense Mobilization and National Petroleum Council begin studies of details.

OCTOBER and NOVEMBER Israel, Britain, and France launch attack on Egypt. Suez Canal is blocked with sunken ships and bridges. Iraq Petroleum Co. pipelines to Mediterranean are blown up in Syria along with main pump stations. Saudi Arabia refuses to let her crude go to the British or French. Some 2,000,000 b/d of Middle East crude denied transportation.

NOVEMBER Cease fire arranged at request of United States and United Nations. UN forces enter Egypt.

USA approves a world tanker pool and other cooperative action under which this country will produce an extra 850,000 b/d of crude oil for meeting deficit from the Middle East. USA says Europe must pay the bill "for the time being."

DECEMBER Britain and France agree to withdraw from Egypt.

Oil-product rationing plans completed for France, Britain, Ireland, and Denmark. Sunday driving banned in Netherlands, Switzerland, Belgium, Luxembourg, and Sweden. Oil deliveries to users reduced in Austria, Norway, Germany, and Italy. Prices rise. Portugal says she suffers little. Europe faces a deficit of 20% to 25% in oil supply even with MEEC plans.

USA reopens study of proposed oil product pipelines from Gulf Coast to the East Coast.

USA suspends all actions toward limiting crude-oil imports to the US, in face of falling imports and new demands for US crude.

a concern of many independent producers, has vanished. US officials formally "suspended" action on a plea of domestic producers for a crackdown on oil imports. Crude-oil imports from the Middle East to the US East Coast dropped in November to 130,000 b/d from the previous average of 300,000 b/d. Crude-oil exports from the United States to Europe, which had been negligible, leaped to 200,000 b/d in November.

A "crash" tanker program has become a subject of top-level study. It would cost at least $1 billion to turn out at least 50 tankers, most of them as large as 60,000 tons. Allocations of steel and other materials for tankers would be required. Even without the program, steel allocations may come to expedite the construction of tankers now on order or planned by private companies.

It is now apparent that the industry itself will carry through a major tanker building plan, whether the government adopts a "crash" program or not. Within the past few weeks new contract announcements for the construction of supertankers have been made almost daily.

Elsewhere in this issue there are reports of new schedules adopted by Shell, British Petroleum, and other major European companies. American oil companies are making similar announcements. In addition, the independent owners of tanker fleets for charter are rushing plans for new and bigger vessels.

On December 13 Victory Carriers Inc. signed a contract with Bethlehem Steel Co. for construction of a 100,000-ton oil carrier —the largest yet planned. The vessel will operate under the American flag. It is planned to operate between the Persian Gulf and the United States. When loaded, it must go around the cape; but, when empty, may pass through Suez. Cargo capacity will be 825,000 bbl. Delivery is planned for 1960. The company also ordered two 46,000-ton tankers at the same time.

On December 1 there were 859 tankers on order or building, with a total deadweight tonnage of 23,490,000. Japan, Great Britain, and Sweden are the principal builders. In the USA 32 vessels were building or on order, with an aggregate tonnage of 900,000. The Victory Carriers' order swells the USA list now to 35, with a tonnage of 1,092,000.

According to data gathered by the statistical department of Sun Oil Co., there were 2,681 tankers in the world fleet, with a total dwt tonnage of 41,623,000 on December 31, 1955.

Various proposed oil products pipelines from the Gulf Coast to the East Coast are under "new serious study" as a result of the Middle East affair. Key companies are Texas Eastern Transmission Co., and Underground Storage and Exploration Inc., Upper Darby, Pa.

The US government withheld any action in the crisis until November 30, when President Eisenhower activated the MEEC. The President acted after Britain and France promised a "phased" withdrawal from Egypt, as the United Nations forces entered the area in stronger force.

Explanation of the MEEC plan came from Dr. Arthur S. Flemming, defense mobilizer, who turns out to be the key government official in the US actions in the Middle East crisis. He said:

"The Director of ODM, after consultation with the Secretary of State and the Acting Secretary of State and with the approval of the President, today (November 30) requested the Secretary of the Interior to authorize fifteen U.S. oil companies to coordinate the efforts they have been making individually to assist in handling the oil supply problem resulting from the closing of the Suez Canal and some pipelines in the Middle East.

"The present problem is essentially a transportation problem. The number of tankers available to carry oil is not sufficient to permit maintaining oil consumption at normal levels everywhere in the world. The shortage of tankers also means that, although the world supply of oil is adequate, under present conditions normal output can not be shipped from the producing areas of the Middle East. The US desires to cooperate as fully as possible in lessening the effects of the present situation in both producing and consuming countries. The contemplated coordination of industry efforts will insure the most efficient use of tankers and the maximum availability of petroleum products, but there will remain, in all probability, some shortages in certain consuming areas which can not be overcome as long as the Suez Canal remains closed and the pipelines are unrepaired."

Oils Shipped Northbound Through the Suez Canal in First Six Months

(Barrels Per Day)

	1956	1955
Crude petroleum	1,379,760	1,223,960
Fuel oil	81,400	44,640
Distillate	3,980	2,332
Gasoline	2,056	728
Kerosine	1,096	636
Other	400	616
Total	1,468,692	1,272,912

Oils Shipped Southbound Through the Suez Canal in First Six Months

(Barrels Per Day)

	1956	1955
Oils transported	42,880	35,680

The arithmetic behind the MEEC plan, as explained by US officials, is based on the belief that tankers are the bottleneck in world oil supply at the moment. On the basis of available ship bottoms, US officials see the tanker pool carrying an extra 850,000 b/d out of the Western Hemisphere—800,000 from the United States and 50,000 from Venezuela. Of this, some 300,000 b/d would go to the US East Coast to make up for Middle East imports diverted to Europe and 50,000 b/d would go to Canada for the same reason. The other 500,000 b/d would be shipped to Europe. Presumably, distribution to European countries would be handled by the OEEC (Organization for European Economic Cooperation).

A subsidiary problem arising from the longer movement of oil around the Cape of Good Hope involves bunkering facilities at African ports. If tankers leave the Persian Gulf with enough bunkers aboard to fuel the entire trip to Europe, they will be unable to carry a full cargo. Most economical plan is to refuel at Durban, Cape Town, or some other port. Fuel should be shipped to these ports by shorter-haul tankers.

Several difficulties arise. In the first place, the African ports do not have adequate shore tankage to store bunkers for the greatly augmented shipping. It has been proposed that this situation be met by taking Liberty ships from the US mothball fleet and using them as floating tanks.

Country of Origin of Oils Transported Northbound Through Suez Canal, in First Six Months

(Barrels Per Day)

	1956	1955
Kuwait*	876,400	881,320
Iran	190,240	73,280
Saudi Arabia	153,520	133,080
Qatar	95,640	62,400
Iraq	82,960	77,760
Bahrein	62,560	32,920
Indonesia and Singapore	45,440	35,040
Aden	2,604	12,880
Egypt	360	2,360
Australia	12	—
New Guinea	—	1,880
Total	1,489,736	1,312,920

*Includes data for Neutral Zone of 12,080 b/d in 1956 and 11,480 b/d in 1955.

Another difficulty is that none of the African ports has harbor facilities adequate to permit supertankers to be refueled at the dock. This means that fuel must be lightered to vessels anchored offshore. This obviously slows down bunkering even where enough lighters are available.

Fuel oil is in short supply now, and the longer haul around the cape will contribute to an accentuation of the shortage.

Members of the MEEC are: American Independent Oil Co., Arabian American Oil Co., Caltex Oil Products Co., Cities Service Co., Cerole Petroleum Corp., Getty Oil Co., Gulf Oil Corp., Sinclair Oil Corp., Socony Mobil Oil Co. Inc., Standard Oil Co. of Calif., Standard Oil Co. (N. J.), Standard-Vacuum Oil Co., The Texas Co., Tidewater Oil Co., and Venezuelan Petroleum Co.

Although the MEEC plan had been studied since August, there were troubles as it started operations. For one thing, Attorney General Herbert Brownell Jr. balked at giving a blanket exemption from the present law requiring use of only US-flag vessels on the Gulf Coast-East Coast run. The exemption would come only for "hardship" cases, he ruled. Then there was trouble persuading some foreign shipowners to join up. Perhaps one reason was to retain freedom to charge high rates—in one case 16 cents a gallon from Persian Gulf to Belgium, for a one-trip revenue of $400,-

000. Although the tanker pool has no price control, it frowns on exorbitant profits. A third stemmed from Saudi Arabia's ban on loading British and French tankers.

Who pays for MEEC oil to Europe? US officials said Europe will pay "for some time," as she has $17.5 billions in dollar reserves, "ample for now." Ultimately, the International Monetary Fund may help. The US Export-Import Bank may lend up to $500 million, a figure suggested by Secretary of State Dulles. The United States will postpone payment of $81 million interest on the British debt, and it also may take over some British military obligations and, possibly, furnish financial or economic aid.

Despite the MEEC plan, Europe faces a shortage of oil this winter which is showing up in cold homes, factories operating four days a week, a strict ban on pleasure driving and, in many countries, rationing of gasoline and fuel oil. All told, US officials estimate Europe's deficit, under the present conditions, at 20% to 25% below supplies before the Egyptian adventure.

How long will the world oil shortage last? Estimates for opening the canal range from two months to a full year, once clearing up starts. Some 40 or more ships are reported sunk in the waterway. Lifting them would take months. Blasting them out might be quicker, but could wreck the canal. Some experts suggest that four to six months will be needed. Unanswered is the question when the political situation will allow work to start.

As for the Iraq Petroleum Co. lines, one month would be needed to get the line going, without pumps, at less than 40% of capacity. Six months to a year would be needed to restore several pumping stations. Again, a question remains: When will politics allow a start of the work?

Oil-Supply Balance Sheet—3rd Quarter 1956

(Barrels Per Day)

Middle East	
Crude-oil production	3,752,700
Through Suez	1,500,000
Through Iraq Petroleum Co. lines	540,000
Through Tapline	320,000
Subtotal	2,360,000
Via Tanker to various destinations	1,392,700
Total	3,752,700

Ultimate settlement of the canal dispute still is clouded. As Britain and France began withdrawing their troops, they insisted on a settlement in accord with general principles backed by the United Nations as follows:

(1) Free and open transit through the Suez Canal without open or disguised discrimination.

(2) Egypt's sovereignty to be respected.

(3) Operation of the canal to be insulated from the politics of any country.

(4) Fixing of tolls and charges to be decided by agreement between Egypt and the users.

(5) A fair proportion of the tolls to be allotted to canal development.

(6) In case of dispute, unresolved differences between the Universal Suez Canal Co., nationalized July 26, and the Egyptian government to be settled by arbitration, with suitable terms of reference and suitable provision for the payments of sums found to be due.

Crude-Oil Distribution Under MEEC Plan

(Barrels Per Day)

From Middle East via Tanker around Africa and to East	1,392,700
Around Africa to Europe	750,000
Tapline	340,000
Subtotal, Middle East	2,482,700
New demand on Western Hemisphere to replace Middle East crude formerly shipped to:	
United States	300,000
Canada	50,000
Extra crude from US to Europe	450,000
Extra crude from Venezuela to Europe	50,000
New demand subtotal	850,000
Total	3,332,700
World transportation deficit	420,700

Over the long run, the whole Middle East crisis is bound to have important effects on operations of the international oil industry —many of them permanent. Chief areas to watch in this regard are tankers, pipelines, and steps towards further Western Hemisphere self-sufficiency in crude-oil and refining capacity. The industry undoubtedly will insure itself against another such disaster. Without an early and satisfactory agreement, widespread changes for the world industry are probable.

In the tanker field, President Eisenhower has asked studies looking toward more vessels in a letter to Dr. Arthur S. Flemming, defense mobilizer. The President said the United States has the authority to order vessels built for the government. Dr. Flemming asked members of the National Petroleum Council to get facts on tankers planned or being built up through 1965, US and worldwide. A rush report is sought.

Without awaiting the NPC report, Military Sea Transport Service called for bids for charter of tankers, including charter of tankers not yet built nor planned. Apparently, MSTS is ready to pay whatever it has to pay for them.

Defense Mobilization Board, meanwhile, considered adding tankers to the list of defense-essential industries. If they are added, tanker construction would have the aid of government in obtaining steel plate and other materials. This is regarded as a "must" for any big tanker program, as steel is in demand and yards are booked with orders.

Though few said it, there were hints that US officials are considering a "crash" tanker program. Emphasis would be on larger ships, which may find it cheaper to go around the African cape than through the Suez Canal, particularly if Suez tolls are increased materially, as has been suggested. A rise of $6.00 per ton has been mentioned as a possibility.

Both oil companies and US government heads are studying new pipelines as alternate routes for crude oil. Two big-inch lines through Turkey, one from Kuwait and one from Iraq, are under consideration because of the trouble in Syria, where the present Iraq line was blown up, and the attitude of Lebanon.

The present crisis may expedite building the proposed line from the French Mediterranean coast through Europe to the North Sea. This would free many tankers now carrying oil from pipeline terminals to Europe. The idea of a new canal and pipeline from the head of the Gulf of Aqaba is being studied—although this route presents political difficulties, since it would presumably traverse Israeli territory.

Inside the United States new oil pipelines are proposed. Promoters of these are urging the Middle East as an agrument in their favor. An oil products system from the Gulf Coast to the East Coast seems in sight, with plans of Texas Eastern Transmission Co., Shreveport, La., to convert the Little Inch line from natural gas to oil products. Another company may carry on from Moundsville, W. Va., to Newark, N.J. US oil producers are urging lines from West Texas to the Gulf Coast, to increase crude-carrying capacity to tidewater.

Destination of Oils Shipped Through the Suez Canal in First Six Months

(Barrels Per Day)

United Kingdom	465,000	418,600
France	276,080	237,200
Netherlands	179,760	146,720
Italy	171,360	136,760
United States	156,640	165,160
Belgium	66,400	40,320
Sweden	44,400	31,560
Germany	30,080	27,440
Other	144,120	107,960
Total	1,533,840	1,311,720

As for further self-sufficiency of the Western Hemisphere—long supported by US military officials—there is widespread support. Oil companies—Cities Service for one—have announced expanded plans in Canada. Venezuela is admitting more oil companies. US officials are urging a stronger reserve producing capacity in the United States, Canada, and elsewhere in this hemisphere.

Dr. Arthur S. Flemming, defense mobilizer, the key government official in the Middle East crisis, has this to say:

"We certainly are not going to take any step to undermine the US domestic industry. If anyone needed evidence of the wisdom of a national policy to keep this country strong in oil, he has it now. If anyone needed evidence of the need for a high domestic oil mobilization base, and for adequate incentive for exploration and development, it is on the record."

At other times, Dr. Flemming and others have extended this kind of thinking to the whole of this hemisphere. A Cabinet Committee on Energy has called for a vigorous hemisphere oil industry. The Department of Defense has a policy that Western Hemisphere oil is the main security in oil for the United States. END

THE BRITISH VIEWPOINT

by E. Lawson Lomax

Neither America nor France and Britain can be judged faultless in their handling of the Suez crisis from nationalization to invasion but British view now is that all haste should be made in mending strained relations.

FROM a British oil man's standpoint, the situation in the Middle East-Suez Canal Zone has reached rock bottom from a political point of view, and to have little to recommend it from a commercial point of view early in December. The British oil industry, for many years, has felt a sense of pride over its achievements in many parts of the world, especially in the Middle East. Apart from Saudi Arabia in which the UK has no oil interest, British management and technicians have been the pioneers of, and responsible for, the main petroleum developments. About 70% of the production in the Middle East was due to British initiative and enterprise in 1955. Up to the time of the closing of the canal, the proportions had remained about the same.

Now, owing to a combination of circumstances, the needs of Europe and the UK for petroleum products can no longer be supplied from the fields which owe the major part of their development to the Eastern Hemisphere; but rationing has had to be introduced in all these consuming countries, and supplies to provide the rationed goods have to be purchased with scarce dollars from the Western Hemisphere.

The reasons for these shortages are varied—stemming originally from the closure of the Suez Canal to international traffic, followed by sabotage; by the blocking of the channel by sunken vessels; the sabotage of the Iraq Petroleum Co.'s pipelines by Syrian soldiers; the denial of Saudi Arabian crude oil to British and French interests; and the shortage of tankers to carry what crude is still available to these interests from Iran, Kuwait, Basrah, and Qatar.

According to Sir Leonard Sinclair, chairman and managing director of Esso Petroleum Co., because the latter company is controlled from the USA, it is in a somewhat different category from the British Petroleum and Shell companies. Esso procured during November 300,000 tons of crude oil from US sources for delivery to its Fawley refinery, in addition to 120,000 tons from Middle East sources. The present capacity of this refinery is 5 million tons per annum; so this oil is about 15 days' supply, or one-half of the month's requirements.

During the first week in December, 11 cargoes were delivered to Fawley, amounting to a total of 200,000 tons, equal to 10 days' requirements.

The British Petroleum Co.'s sources of supply for crude oil—all of which are in the Middle East—received during the 7 days beginning November 20, when its first tanker arrived by the cape route, 11 cargoes of crude oil totaling 319,000 tons—160,000 tons for the Kent refinery, 14 days' supply; 84,000 tons for Grangemouth refinery, 13.5 days' supply; and 75,000 tons for Llandarcy refinery, 8.5 days' supply.

The Shell group during a similar period received 12 cargoes of crude, totaling 277,400 tons, of which 7 cargoes came from the Middle East around the cape, totaling 194,000 tons—3 cargoes totaling 49,100 tons from the Western Hemisphere; and 2 cargoes from the Far East totaling 33,600 tons via the cape.

These early cargoes were carried in vessels which already had been in the Persian Gulf area, were routed there, or were rerouted from other destinations. Except for emergency supplies, the difficulty will come when these vessels have made the return journey to the Middle East or any other location—which was expected to happen about mid-January, when present refinery stocks of crude oil would be much depleted.

On December 4, steep rises in price of all petroleum products were announced by the Ministry of Fuel and Power. The increase in the price of motor gasoline is one shilling and five pence per gallon, and on diesel fuel one shilling and 4½ pence per gallon—each of these increases including one shilling per gallon customs' duty; 3½ pence per gallon increase on heavy fuel oil; and 3 pence per gallon on all other petroleum products except lube oils and bitumen. Prior to this increase the cost of fuel oil, thermally, compared favorably to the cost of coal; but now it rises by £3.10.0 per ton, equivalent to an increase in cost of coal by more than £2 per ton.

These increases in costs are bound to have a very unfavorable effect on the country's economy; costs of production are bound to increase, which will be followed by increases in the price of transportation both for goods and passengers, increases in food costs, etc.—which inevitably will give rise to demands for wage increases, followed very probably by strikes.

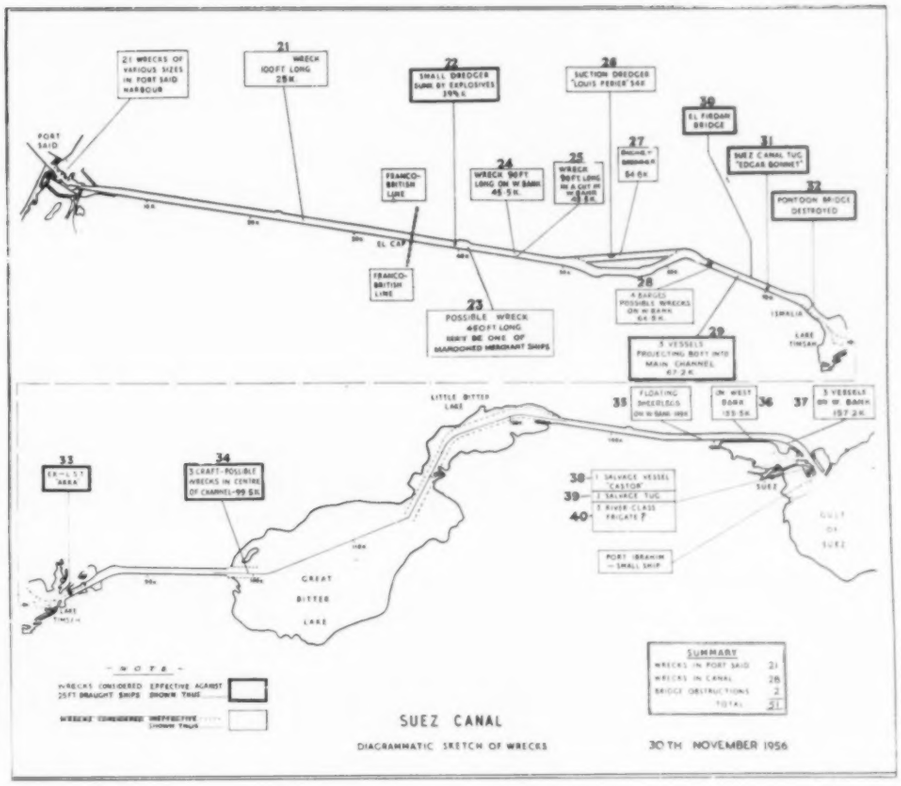
The British oil industry in the past has prided itself on maintaining full supplies at reasonable prices, the cost of petroleum products having risen much less since 1939 than any other similar commodity; but these last increases have given it a severe shock. It is also felt that this is only the beginning of increases, especially in the customs' duty which, on motor fuel, now amounts to 3/6 per gallon (US 49 cents), nearly 60% of the cost to the consumer. The British public is skeptical about any future decrease in this, as that would be unprecedented. These are the facts of the case arising out of the Middle East and Suez crisis, and it is no wonder that the British public and the British oil men have very strong views about the present situation.

Thinking here is that England and France were in a much better position than the USA to measure the possible effect of Nasser's nationalization of the Suez Canal on the Middle East's oil economy, as well as the effect of the continued animosity between the Arab world and Israel—both of which nations have been inciting the other to attack for years, and both of which are equally culpable for the chaos in Middle East affairs. In inner circles, also, it was realized that Russia was playing a hand in developments of the quarrel, which was for the furtherance of its own interests.

It is a commonly expressed opinion that in this matter the USA has been running with both hare and hounds and, therefore, has helped to foster this chaos.

Secretary of State Dulles is criticized severely for his tactics in connection with the proposed Canal Users' Association. British thought is that the dilatory manner in which the situation apparently was being handled in the USA finally contributed to the decision to send an expedition to stop the Egypt-Israel fighting. It was a major shock to British and French interests when this expedition was carrying its program out in a very successful manner, and would have completed it in a few days, it was called on by the UN and the USA to cease this operation.

(Continued to page 56)


21 WRECKS OF VARIOUS SIZES IN PORT SAID HARBOUR
21 WRECK 100FT LONG 25K.
22 SMALL DREDGER SUNK BY EXPLOSIVES 39K.
26 SUCTION DREDGER 'LOUIS FERRIER' 54K
30 EL FIRDAN BRIDGE
31 SUEZ CANAL TUG 'EDGAR BONNET'
32 PONTOON BRIDGE DESTROYED
27 RAILWAY BRIDGE 54.6K
24 WRECK 90FT LONG ON W BANK 46.5K.
25 WRECK 80FT LONG ON A CUT AT 46.8K 47.8K.
FRANCO-BRITISH LINE
PORT SAID
EL CAP
23 POSSIBLE WRECK 460FT LONG MAY BE ONE OF MARROWED MERCHANT SHIPS
28 4 BARGES POSSIBLE WRECKS ON W BANK 64.5K.
29 5 VESSELS PROJECTING BOFT INTO MAIN CHANNEL 67.2K.
LAKE TIMSAH
ISMAILIA
LITTLE BITTER LAKE
35 FLOATING DREDGERS ON W BANK 149K
36 ON WEST BANK 153.5K
37 5 VESSELS ON W BANK 157.2K
33 34 3 CRAFT-POSSIBLE WRECKS IN CENTRE OF CHANNEL-99.5K
38 1 SALVAGE VESSEL 'CASTOR'
39 1 SALVAGE TUG
40 1 RIVER CLASS FRIGATE ?
PORT IBRAHIM — SMALL SHIP
GREAT BITTER LAKE
SUEZ
GULF OF SUEZ
- NOTE -
WRECKS CONSIDERED EFFECTIVE AGAINST 25FT DRAUGHT SHIPS SHOWN THUS
WRECKS CONSIDERED INEFFECTIVE SHOWN THUS
SUMMARY
WRECKS IN PORT SAID 21
WRECKS IN CANAL 28
BRIDGE OBSTRUCTIONS 2
TOTAL 51
SUEZ CANAL
DIAGRAMMATIC SKETCH OF WRECKS
30TH NOVEMBER 1956

On the closing days of 1956 an international fleet of salvage vessels began the task of clearing the canal. Early estimates were that a one-way 25-foot channel can be opened by March, but that full restoration will require several additional months.

BRITISH ADMIRALTY OFFERS SUEZ CLEARANCE PLAN

THE British Admiralty has completed a survey of Suez and prepared a plan for clearing the channel in three stages. Equipment available for performing the work is suggested. It consists of a fleet of 35 British salvage ships. All were available at the beginning of December or could be made available early in January 1957.

The Admiralty stated on December 3 that it is now possible to obtain a clearer picture of the problem involved in re-opening the Suez Canal and to assess the suitability of the forces we have gathered together for doing the job.

Fifty-one obstructions have to be cleared away before the canal is fully restored to its normal state, and there may be more beneath the surface of the water which have not yet been located; mines have also been laid at the Suez end. In order that ships of limited size can begin using the canal again without waiting for complete clearance of the waterway, it is evident that the operations should proceed in three stages.

The first stage involves clearance of a through channel suitable for ships of a 25-ft and at least a 60-ft beam, similar to that already achieved at Port Said. This will involve the shifting of mine wrecks and two bridges out of the channel, all of which are in Egyptian controlled territory.

Stage II requires clearance of the remaining wrecks from the channel to enable complete freedom of navigation.

The removal of the débris from the berths, general tidying up, and dispersal of the wrecks from the canal altogether is seen as stage III.

The accomplishment of stage I is obviously the one requiring the utmost urgency so that trade may again flow, albeit upon a reduced scale until stage II can be completed. The object must be to open the channel quickly without necessarily removing the wrecks right off the scene. If they cannot be completely removed quickly, they must be lifted by lifting craft and coastal salvage vessels to the side of the channel or slewed parallel to the canal banks. In other cases, where the weight of the ship is too great for lifting craft, buoyancy may have to be restored by patching, coffer-damming, and pumping, or by the use of compressed air. The "Paul Solente" (3,700 tons) at Port Said, with 8 holes blown in her bottom, may have to be dealt with in this manner.

The best method for the removal of a particular wreck will have to be decided after a survey has been carried out upon it. The most suitable salvage craft, or a combination of craft, can then be allocated for the job. For example, the 115-ton tug "Actif," at Port Said, could be lifted directly from the bottom by one coastal salvage vessel.

The coastal salvage vessel is an ideal ship for the operations envisaged in stage I. Equipped with horns and heavy rollers, it can lift 200 tons deadweight over the bow; has shallow draft; and can sit on the bottom if required. These ships were evolved for the naval service as a result of experience

(*Continued to page 56*)

W. P. Downey, a veteran of more than 30 years in the heavy construction industry, has been vice president in charge of construction for The Fluor Corp. Ltd. since 1952. He joined Fluor as a steel erection superintendent in 1930 and, after 8 years, became general superintendent. In 1951 he became manager of domestic construction, and a year later assumed his present position.

Mr. Downey early demonstrated his aptitude for rigging, and spent much of his time and effort in perfecting and utilizing rigging procedures. In 1950 he developed and perfected a rigging procedure for erecting the various components for building vessels and steel and concrete structures at ground level and raising them in place for a Thermofor catalytic cracking unit.

NEW CONSTRUCTION METHODS ADOPTED BY CHINESE PETROLEUM CORPORATION

by W. P. Downey

DESPITE a language barrier, lack of familiarity with new rigging techniques, and the necessity to adapt available equipment for recommended erection methods, Chinese Petroleum Corp. successfully constructed its first Thermofor catalytic cracking (TCC) unit at its Kaohsiung refinery located on the southwest coast of Taiwan (Formosa).

Mastering the unit lift method of erection to perfection, Chinese Petroleum construction crews easily grasped new methods of erection recommended by the Fluor Corp. Ltd., which was contracted to perform all designing, engineering, and purchasing for the plant.

In the spring of 1954 K. Y. King, president of the Chinese Petroleum Corp., and C. D. Shiah, their American representative, called at Fluor's construction offices to discuss construction methods and equipment to be used in erection of the proposed TCC unit.

Mr. King and Dr. Shiah were acquainted with the method of erection of TCC units developed by Fluor, but were concerned about the possible need for large expenditures for specialized construction equipment.

Mr. King was assured that the method of erection proposed could be adapted for use of available equipment. Possible use of capstans for hoists was mentioned in the event power hoists were not available.

The first step in the development of the procedure required a study by Chinese Petroleum personnel on Taiwan to evaluate equipment needs. A complete report outlining the method and equipment used in the United States was submitted as a guide in making this study.

Within a short time after the information had been submitted on procedures previously used, a tabulation of available rigging equipment was submitted by Chinese Petroleum. All correspondence was carried on in English, which placed the brunt of interpretation on the Chinese.

A review of equipment used in the USA indicated to M. C. Chang of the Kaohsiung refinery on Taiwan that drastic substitutions for American construction equipment would be necessary to enable use of construction equipment owned by Chinese Petroleum.

Mr. Chang submitted a complete list of all available equipment which was to be adapted for use in erecting the Chinese Petroleum unit.

As decision had been made to utilize the "unit lift" method in erection of the TCC unit on Taiwan, a study was started to determine loading of equipment during erection.

It is of prime interest that the Chinese Petroleum engineers on Taiwan proceeded with independent calculations to determine such loading. This indicated that they were cognizant of the basic principles involved even though no detailed design drawings or calculations had been submitted to them.

Chinese Petroleum included in the list of available equipment two ginpoles which had been purchased from the American Hoist and Derrick Co. and used on previous work. These poles had a nominal capacity of 25 tons, and were each 105 ft long.

It was desirable and economical to utilize the available ginpoles which could be revamped as necessary to meet erection requirements. In collaboration with American Hoist and Derrick, the maximum allowable deadload capacity of the poles was investigated. Height requirements indicated the need for poles 135 ft long. Plans were formulated to extend the poles to the desired length, and a load check was made to provide the necessary safety factor.

Cut to the contemplated loading of the ginpoles, it was considered best practice to utilize the poles as a "gallows beam."

A method of combining the flexibility of ginpole plus strongback with the added strength developed by the "gallows beam" arrangement was agreed upon. In collaboration with Chinese Petroleum, the design data and detailed sketches for fabrication or required beam and connections were developed. Fig. 1 illustrates general method

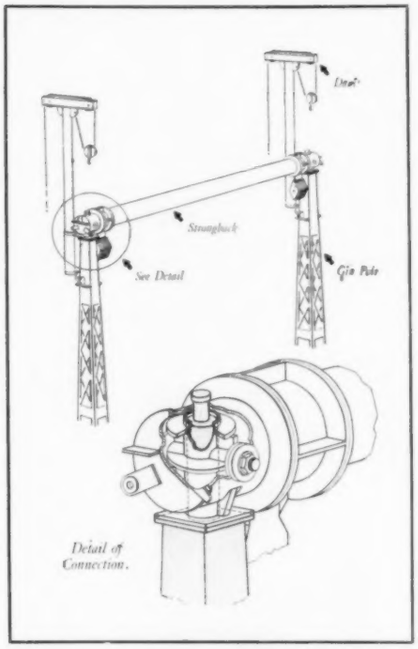


Fig. 1—Strongback converting ginpoles to gallow beams.

of converting poles to "gallows beam" and connection of main load blocks, and shows davits used for raising beams into position.

The pole insert and the "gallows beam" connection, together with the ginpole davits, were fabricated by Chinese Petroleum personnel on Taiwan from drawings provided by Fluor. Photograph "A" shows the use of davit in raising beam for connection to top of poles.

The required ginpole support towers were fabricated in the field by Chinese Petroleum personnel from drawings of towers previously used in the USA. Materials used in the fabrication of all such items were secured by Chinese Petroleum from available surpluses on the island. Responsibility for necessary substitutions of materials in the fabrication of the pole extensions and the tower supports and tie-ins were assumed by Chinese Petroleum.

Under the terms of the contract, six Chinese Petroleum employees were to visit the United States to become acquainted first-hand with materials, construction equipment, and methods of construction and operation to be used in the TCC unit to be erected on Taiwan.

Three of the Chinese Petroleum representatives were assigned to the construction division for six months. Jerome Hu, manager of the Kaohsiung refinery, who was the Chinese Petroleum resident engineer, introduced S. K. Peng, C. H. Chiang, H. Y. Chow, S. K. Fan, Y. C. Chow, and Wei Chow to personnel in the Construction Division.

Photo "B" shows the Chinese Petroleum representatives during their stay in Los Angeles.

In preparation for the visit of Chinese Petroleum riggers, the working model of the TCC construction unit had been set up as a medium for explaining desired procedures recommended for use in the erection of the unit. It was of paramount interest how quickly and completely these Chinese Petroleum employees grasped all phases of the rigging problems in spite of the fact that all communication was in English.

Messrs. Peng, Chiang, and Chow, who were the rigging and construction supervisors of Chinese Petroleum, were assigned to the construction division for on-the-job training in construction methods and procedures. Arrangements were made for a short stay at the Los Angeles plant. During the stay in Los Angeles, the construction model of the TCC unit was erected from ground level to removal of poles after erection of the separator surge. It was felt that this preliminary program would assist them in understanding field operations when they visited construction projects.

All of these men spent approximately four months on Fluor field jobs, one of which included the erection of a TCC unit.

Photo "A"—Raising beam to top of poles.

Photo "B"—Chinese Petroleum personnel in the United States: Left to right are C. H. Chiang, S. K. Fan, Wei Chow, Y. C. Chow, S. K. Peng, J. O. N. Hu, and H. Y. Chow.

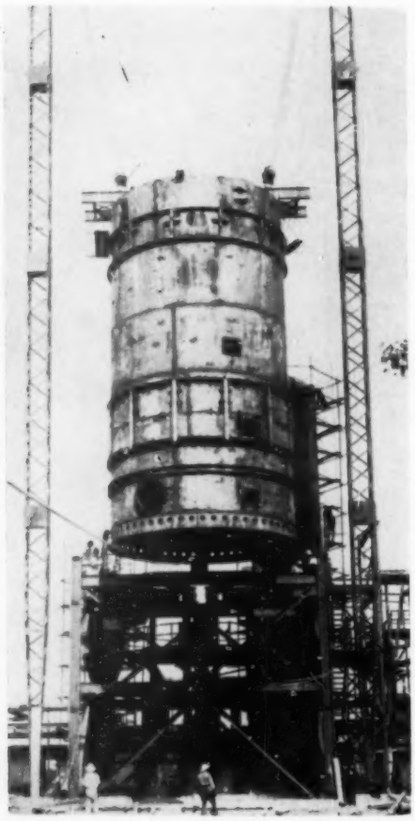


Photo "C"—Raising kiln into position: Poles rest on ground during operation.

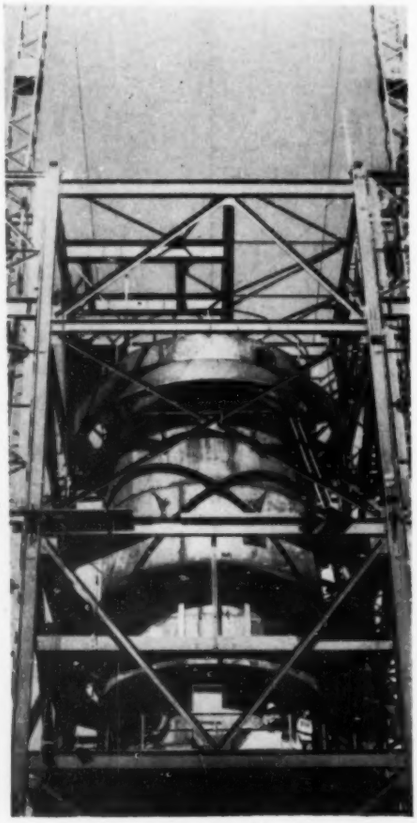


Photo "D"—Jumping poles to 75-ft elevation.

During the period spent on construction jobs, they were able to absorb US methods and procedures and plan for adaptation to their problems.

Drawings were submitted to Chinese Petroleum indicating recommended rigging procedures. Detailed sketches were included indicating method of connection for each lift, as well as height clearances on each lift.

Also included were general layouts of all rigging equipment, with a list of such equipment. These drawings and equipment lists provided the substitutions of equipment necessary to utilize Chinese Petroleum available rigging equipment without the necessity of purchasing any major equipment.

Final procedure developed for the work contemplated erecting kiln and two sections of structure with poles resting on the ground. Poles were to be jumped to the 75-ft elevation and, after erection of steel around the reactor, jumped with base at 150-ft elevation. Erection of the unit was to be completed with base of poles at this elevation.

Progress reports received from the field indicated excellent results in the construction of the TCC unit. The first section of steel was assembled in place prior to lifting the kiln.

The kiln was raised into position in the structure on November 7, 1955. In order to stay within the capacity of the rigging equipment, it was necessary to leave out a portion of the kiln internals during lifting operations. These internals were installed after erection of the kiln, and such installation proceeded during the balance of rigging operations. Photo "C" herein shows kiln being raised into position.

The unit was topped out with erection of the separator surge tank on December 24, 1955. Total elapsed time from erection of the kiln to raising the separator surge aggregated approximately seven weeks. Final completion of rigging operations, including erection of lift pipe, flare stack, and miscellaneous other equipment, required an additional seven weeks. The entire rigging operations on this TCC unit required approximately four months. Photos "D" and "E" illustrate jumping poles and the setting of the reactor off center in the structure.

The results secured by Chinese Petroleum personnel were impressive. Without having previously constructed a TCC unit, this company utilized a procedure recently developed in the USA and was able to complete all rigging operations in record time.

New equipment not being available, it was necessary to improvise to utilize existing facilities. All of this transition and the enviable results were obtained in spite of what might have been considered a language barrier. Photo "F" shows the unit complete prior to removal of rigging equipment.

All Fluor personnel who worked with Chinese Petroleum personnel have a sincere respect for their ability to bridge the language gap and secure excellent results.

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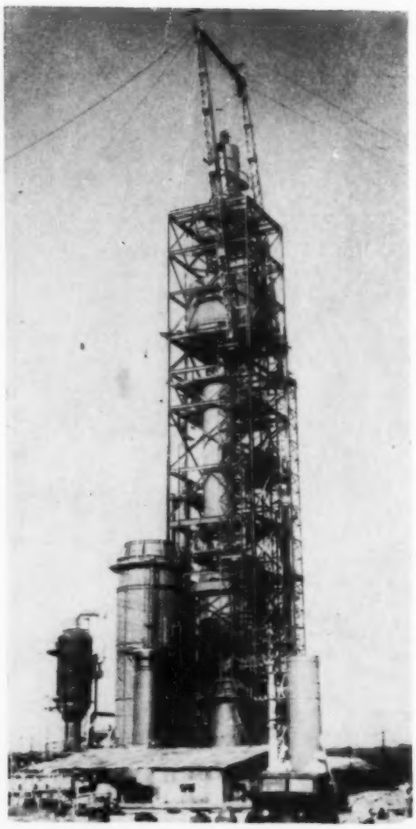


Photo "F"—TCC unit rigging complete with poles and support towers in place prior to removal.

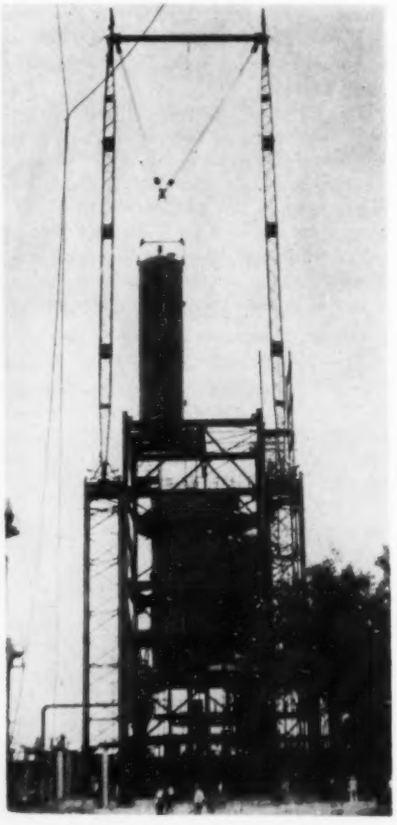


Photo "E"—Setting reactor in structure.

1956 WORLD CRUDE OUTPUT UP 7.2%

WORLD crude production increased 7.2% in 1956, to 16,520,000 b/d, according to preliminary estimates prepared by *World Petroleum*. The estimates were made at mid-December, before final November figures were available in many areas. Final figures may be somewhat higher as USA, Canadian, and Venezuelan fields are opened up to meet the Suez crisis. Liftings from the Persian Gulf may be somewhat better than indicated as a result of work of the British and American emergency committees.

Early December increases in USA production were up more than 200,000 b/d, bringing the total above 7,350,000 b/d. This compares with an average of 7,120,000 b/d in the first 10 months. Average for the year was up 5%, to 7,146,200 b/d.

Transportation difficulties were a prime factor in the crude supply situation at Gulf ports. Pipelines from the interior were loaded to capacity, and some unusual and costly movements were employed to increase the supply. In the meantime stocks at seaboard terminals were being drawn down. Producers were reluctant to increase output too rapidly at present prices.

In Venezuela, transportation also was a limiting factor. Output for the year is estimated at 2,433,000 b/d, an increase of 275,600 b/d, or 12.8%. Late in the year output was in excess of 2,600,000 b/d to meet the combined seasonal demand on the Atlantic Coast for heavy fuel plus the higher demand from Canadian and European refineries to replace Middle East crude.

Canadian output, which normally declines in December, has continued at even higher levels than were attained during the summer. The Trans-Mountain pipeline to the Pacific was operating at full capacity, and had been stepped up by emergency measures. Eastbound lines also were full. For the year as a whole, Canadian production averaged 456,000 b/d, compared with 354,400 b/d in 1955, an increase of 28%.

Middle East production during the last 2 months of the year averaged about 2,330,000 b/d, a decrease of 1,575,000 b/d from the October level of just over 3,900,000 b/d. For the year as a whole, output averaged 3,487,600 b/d, compared with 3,278,000 b/d in 1955, an increase of 6.4%.

The Suez crisis did not bear equally on all producing countries in the Middle East region, for a variety of reasons. Iraq was hardest hit because of the sabotage of pipelines through Syria, virtually the only outlet for Kirkuk crude. Output of the southern fields was moving through Fao, at the head of the Persian Gulf, as tankers were available. Output averaging 771,200 b/d in October was down to about 200,000 b/d after the pipeline destruction. Iraq production for the year averaged 641,800 b/d, a drop of 7.1% under 1955.

Saudi Arabian output was curtailed by two factors, viz., the government embargo on shipments to British or French territories, and the lack of tankers at Ras Tanura. Biggest factor was the mandatory shutdown of the subsea line to Bahrain which had been carrying about 200,000 b/d of crude to the Bapco refinery. This embargo had the effect of increasing the outlet for Iranian crude. Some 50,000 b/d of this oil was shuttled on a short haul to Bahrain partly to replace the embargoed Saudi Arabian crude.

Being entirely dependent on ocean shipping through Suez, Kuwait was hard hit. Output during the last 2 months was off 50%, to less than 600,000 b/d. There was

(*Continued on page 56*)

WORLD CRUDE OIL PRODUCTION

(Thousands of Barrels Daily)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	1956	1955
United States	7,228.3	7,066.9	7,113.2	7,176.2	7,146.2	6,806.9
Canada	455.6	401.7	472.0	494.7	456.0	354.4
Mexico	261.3	252.2	252.3	254.0	255.0	244.8
Total North America	7,945.2	7,720.8	7,837.5	7,924.9	7,857.2	7,406.1
Argentina	84.0	82.1	81.2	86.3	83.4	93.5
Bolivia	8.5	8.5	8.8	9.2	8.8	7.6
Brazil	6.9	7.1	12.8	21.1	10.9	5.5
Chile	8.5	8.8	10.1	10.5	9.5	7.0
Colombia	115.7	119.3	122.5	124.2	120.4	108.7
Cuba	1.5	1.8	1.6	1.7	1.7	1.0
Ecuador	9.9	8.9	9.8	9.8	9.8	9.8
Peru	48.3	50.7	50.5	50.5	49.9	47.0
Trinidad	74.4	77.2	80.6	83.9	79.0	67.6
Venezuela	2,353.7	2,374.3	2,460.5	2,543.6	2,433.0	2,157.4
Total S. America & Caribbean	2,711.4	2,738.7	2,838.4	2,940.8	2,806.4	2,495.1
Total Western Hemisphere	10,656.6	10,459.5	10,675.9	10,865.7	10,663.6	9,901.2
Algeria	1.0	0.7	0.6	0.6	0.7	1.2
Austria	65.4	64.4	63.0	62.2	63.8	68.2
France	21.7	23.3	25.0	26.5	24.1	16.8
French Morocco	2.2	2.2	1.9	1.8	2.0	2.1
Germany (West)	63.9	67.1	70.0	71.0	68.0	61.5
Italy	7.9	9.8	12.0	12.4	10.5	4.2
Netherlands	18.5	20.6	21.2	22.1	20.6	19.6
United Kingdom	1.3	1.4	1.3	1.2	1.3	1.1
Total W. Europe & N. Africa (Excl. USSR)	181.9	189.5	195.0	197.8	191.0	174.7
Albania	6.0	6.0	6.0	6.0	6.0	4.4
Czechoslovakia	3.0	3.0	3.0	3.0	3.0	2.8
Hungary	35.0	35.0	35.0	35.0	35.0	30.0
Poland	7.0	7.0	7.0	7.0	7.0	4.0
Romania	223.0	223.0	223.0	223.0	223.0	211.5
Yugoslavia	3.0	3.0	3.0	3.0	3.0	5.2
USSR	1,568.0	1,568.0	1,568.0	1,568.0	1,568.0	1,412.0
Total USSR & Sat.	1,845.0	1,845.0	1,845.0	1,845.0	1,845.0	1,669.9
Bahrain	30.0	30.0	30.0	30.0	30.0	30.1
Egypt	33.3	37.9	37.9	36.0	36.6	34.4
Iran	363.3	565.8	571.7	611.0	547.5	325.4
Iraq	522.4	776.1	759.5	390.4	641.8	690.6
Israel	0.3	0.6	0.6	0.6	0.5	0.0
Kuwait	1,124.8	1,199.7	1,167.4	791.9	1,075.2	1,091.8
Neutral Zone	30.0	37.2	40.0	40.1	37.5	23.9
Qatar	120.3	126.3	125.9	131.0	127.3	113.8
Saudi Arabia	1,000.2	1,086.2	1,029.1	818.3	985.3	965.0
Turkey	5.9	5.5	5.3	7.1	5.9	3.0
Total Middle East	3,230.5	3,865.3	3,767.4	2,856.4	3,487.6	3,278.0
British Borneo	115.1	117.0	120.6	125.0	119.4	109.1
Burma	4.4	4.6	5.3	5.3	4.9	4.4
China	19.3	19.3	19.3	19.3	19.3	14.1
India	6.2	6.3	6.2	6.1	6.2	7.1
Indonesia	251.2	251.2	257.9	256.0	254.1	234.0
Japan	5.6	6.9	5.9	5.9	6.1	6.1
New Guinea	7.1	7.1	7.1	7.1	7.1	9.4
Pakistan	5.8	5.6	5.7	5.7	5.7	5.7
Total Asia & Australasia	414.7	418.0	428.0	430.4	422.8	389.9
Total Eastern Hemisphere	5,672.1	6,317.8	6,235.4	5,329.6	5,856.4	5,512.5
World Total	16,328.7	16,777.3	16,911.3	16,195.2	16,520.0	15,413.7

Production of Sakhalin oil fields is modest, and planned targets are conservative. Hence, additional oil supplies from distant sources are needed to cover the rising consumption of

OIL IN THE SOVIET FAR EAST AND SAKHALIN

by George G. Rosu

Oil developments on Sakhalin are far less spectacular than the political fame of this Island fostered by the revived Far Eastern struggle between Russia and Japan. During the interlude between the two World Wars, their rivalry had an emulative character which led to the discovery of the North Sakhalin oil fields. Oil was first struck here by Japanese exploration teams in 1921. Under the Treaty of Peking of 1925, Russia leased to Japan the areas around the oil discoveries for a 45-year period. Three years later, however, Soviet drilling teams were dispatched to Sakhalin, and they started tapping the formations running parallel to the Japanese concessions. During the following two decades, Russia increased her oil production whereas Japan followed a policy of building up industrial reserves. In 1945, the latter were seized by Russia when she occupied the whole Sakhalin Island. By a decree of 1947, the Kurile Islands were incorporated with Sakhalin into one administrative unit called Sakhalin Oblast.

Production: Looking back over the last 11 years, the seizure by Russia of the Japanese oil reserves seems to have but little bearing upon the Sakhalin production which rose at a slow rate. (See Table I).

As early as 1947, the Soviet Planning Board approved a rather ambitious plan for transforming Sakhalin Island into an "invincible Soviet fortress on the Pacific Ocean" as well as for developing its oil fields, but the application of this plan did not get under way before late in 1953. From then on, the so-called "advanced methods" applied in the Volga-Urals area have been rushed to Sakhalin without studying in advance whether or not the local conditions permit their application. A training program for drillers and oil technicians from among the local population has also been intensified with a view of reducing the import of skills from European Russia. Even the Far East oil Prospecting Trust which, for years, was a laggard, has started to announce higher percentages of Plan fulfillment but no spectacular discoveries as yet.

Oil activity is still confined to the area of the Okha Rayon, which was being produced prior to 1945, and has not yet expanded southwards beyond Katangli. The Okha City has become the main oil center of the island. Around it, the cluster of workers' settlements at Moskalvo, Vostochny, Ekhabi and Gubkino is growing steadily.

The Sakhalin oil industry is under the guidance of the Far Eastern Oil Union (Obyedineniye Dalneft) which, in addition to the Oil Prospecting Trust and the Sakhalin Oil Industry Construction Trust, directs the activities of the Okha, Ekhabi, Vostochny and Katangli Oil Trusts. Drilling operations are carried out by the two drilling offices of the Okha Trust. The perusal of official sources reveals that the sections of these oil trusts are still insufficiently staffed with drillers, technicians and engineers but that there is an excess of bureaucratic "cadres."

TABLE I

OIL PRODUCTION IN SAKHALIN[1]
(Barrels Daily)

1939	8,240	1953	30,000
1942	13,700[2]	1954	33,000
1945	16,000	1955	34,300
1950	23,570	Plan 1956	37,700
1952	27,800	Plan 1960	51,450[3]

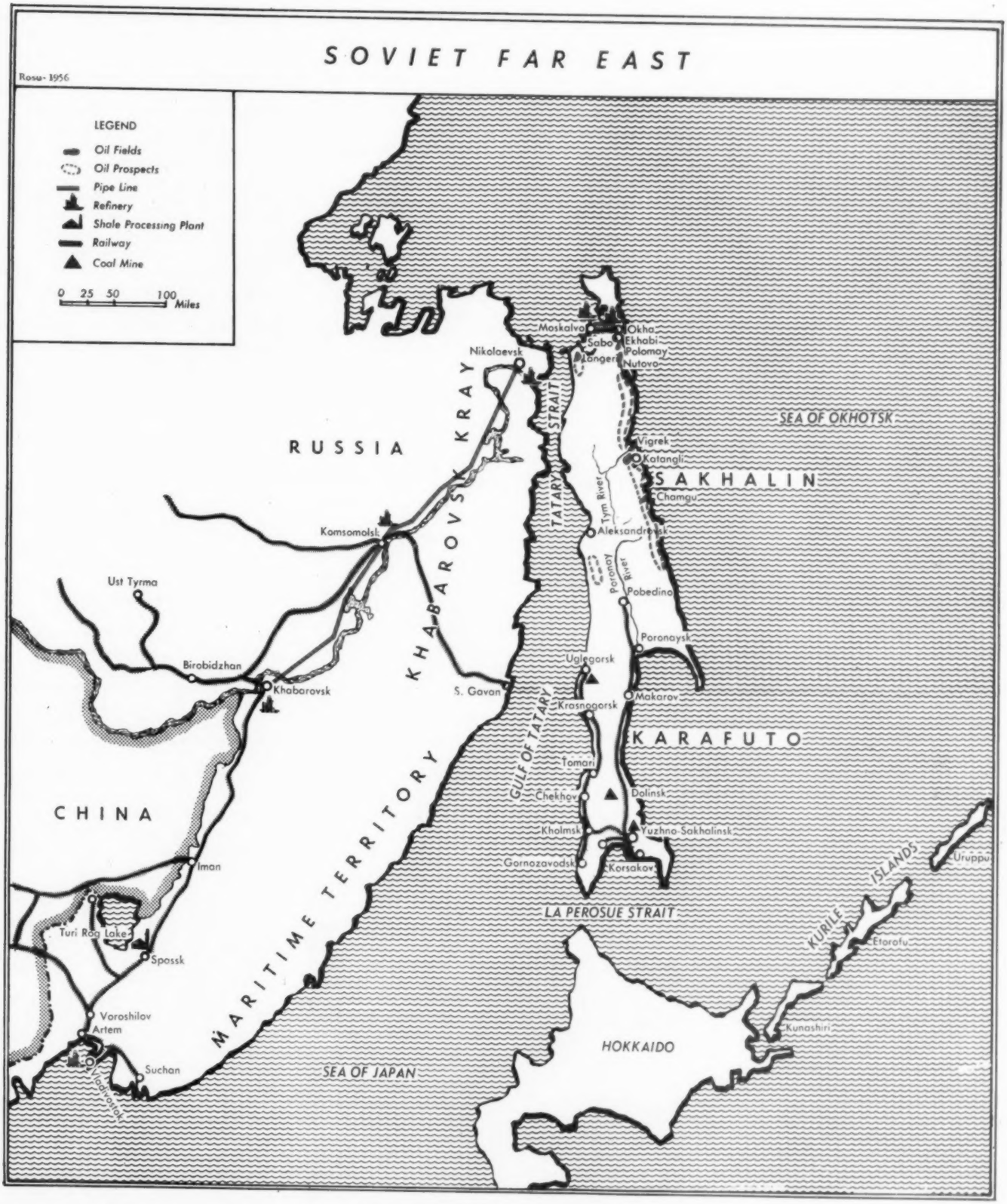
(1) Figures prior to 1950 are mostly estimates. Daily averages for the post-1950 years were computed from percentages revealed by Soviet official sources. Metric tons were converted to barrels at 7.17 barrels per ton as computed from specific gravities of various crudes and their proportionate weight in overall Sakhalin production.
(2) A target of 25,200 b/d was set for 1942 by the Third Five-Year Plan, but only half of the planned production was actually achieved.
(3) The 1960 target is indicated in some official sources as 50%, in some other as 60% over the 1955 production figure. Hence, it may vary between 51,450 and 54,800 b/d.

The targets set by the Fifth Five-Year Plan (1951-1955) were not fulfilled. For three reasons. First, the supply of equipment and materials was utterly insufficient. Second, the exploitation of the Okha fields presents problems for which required specific techniques have not yet been perfected. And third, the extent of the Sakhalin deposits is open to doubt. Their economic value may be assessed with the help of the following data.

Geology: Sakhalin Island covers an area of 30,000 square miles. It measures 560 miles in length, and its width varies between 4 miles across the Okha Isthmus, and 100 miles south of the 50° Parallel. The island is traversed by two parallel mountain ranges: The Zapadno-Sakhalinskiy and the Vostochno-Sakhalinskiy which are covered with taiga vegetation. Between these ranges are crowded the narrow Tym-Poronay and the Yuzhno-Sakhalinskaya Valleys that, at places, are marshy and covered with peat.

The Alpine folding zone of the Sakhalin Island is confined to a narrow and deep trough which is shut between two median masses: the Mesozoic folding zone of Eastern Siberia, from which it is separated by a thrust-type disturbance buried in the Tatar Strait; and the Kolym median mass of the Sea of Okhotsk. Its nature and location explain the peculiarity of its tectonic. The narrow belt of Tertiary deposits consists of asymmetrical folds crossed by faults. The oil-bearing formations on both coasts of Northern Sakhalin are in the Lower Pliocene-Upper Miocene Age.

The richer oil-bearing formations, particularly those in the Okha Rayon, are situated along the northeastern shores, and



represent a relatively asymmetrical anticlinal fold. The Okha structure is separated into three main blocks by a longitudinal as well as by several transversal faults disposed terrace-wise. This results in split and disconnected oil-bearing horizons in the three blocks. On this structure are located the main producing fields: Okha, Ekhabi, Vostochny and Moskalvo.

The fields further south, i.e. Polomay, Nutovo, Vigrek, Katangli and the undeveloped Chamga are also located on anticlinal folds, as is the Langeri field on the island's northeastern coast.

The facies composition of Northern Sakhalin is similar in one respect, namely the lack of Tertiary outcrops, an absence which encumbers surface geological work. For the rest, it is dissimilar: the Tertiary deposits of the western coast have a predominantly continental character while

those of the eastern coast are mostly marine lagoon deposits.

While the information on the lithology of these formations is still scanty it is, however, known that oil is accumulated in a series of thick sandy shales alternated with sandstone and conglomerate beds. The number of pay sands varies between 4 and 12 (at Okha), and their thickness may reach a maximum of 200 feet.

The southern half of the island (Karafuto, which was Japanese until 1945) is less known geologically but hopes for rich strikes are very doubtful. This region is rich in coal deposits that are being mined at Uglegorsk, Dolinsk and Yuzhno-Sakhalinsk.

Up to 1953, the greatest portion of crude produced in Northern Sakhalin came from the shallow formations (400 to 1,200 feet). During the last three years, deeper horizons (below 4,000 feet) have been tapped. Despite deeper drilling and the development of adjacent areas, however, production is increasing very slowly.

Reserves: The proven reserves of this area are close to 300 million barrels. Total ultimate reserves may surpass two billion barrels. Their exploitation, however, is handicapped by geological conditions that, in turn, render questionable the commercial value of these deposits. On the other hand, it is true that the replacement of the obsolete and over-used equipment progresses very slowly. Better drilling methods are delayed by poor working conditions and by lack of co-ordination among the sections of each trust. Prospecting of new fields, and their preparation for drilling is also lagging behind the planned targets.

Operations: Official sources claim that turbine drilling has made great strides, and that this method accounts now for 80% of the overall drilled footage. They also assert that during the current Plan period the average speed per rig is expected to rise from 2,000 to 4,000 feet per month as a consequence of this innovation. Nothing is known, however, about the number of turbodrill outfits in the field nor has anything been revealed about the footage planned to be drilled; hence, it is not possible to assess the official percentages. The workers are, apparently, still unfamiliar with this new tool, for the cost per drilled foot has increased instead of diminishing.

Drilling with water instead of the chemically treated drilling muds is also being tried out on an experimental basis and in a few spots only. The spreading of this new method is handicapped, among other things, by the severe climate of the Island. Average temperature is 35° F. below zero in oil-producing North Sakhalin and strong cold winds and fog are daily phenomena.

Secondary recovery methods, i.e. artificial maintenance of deposit pressure through flooding or injecting air into the strata, have also been practiced in several fields at Okha and Ekhabi, but their geological peculiarities impede the use of this method on an industrial scale.

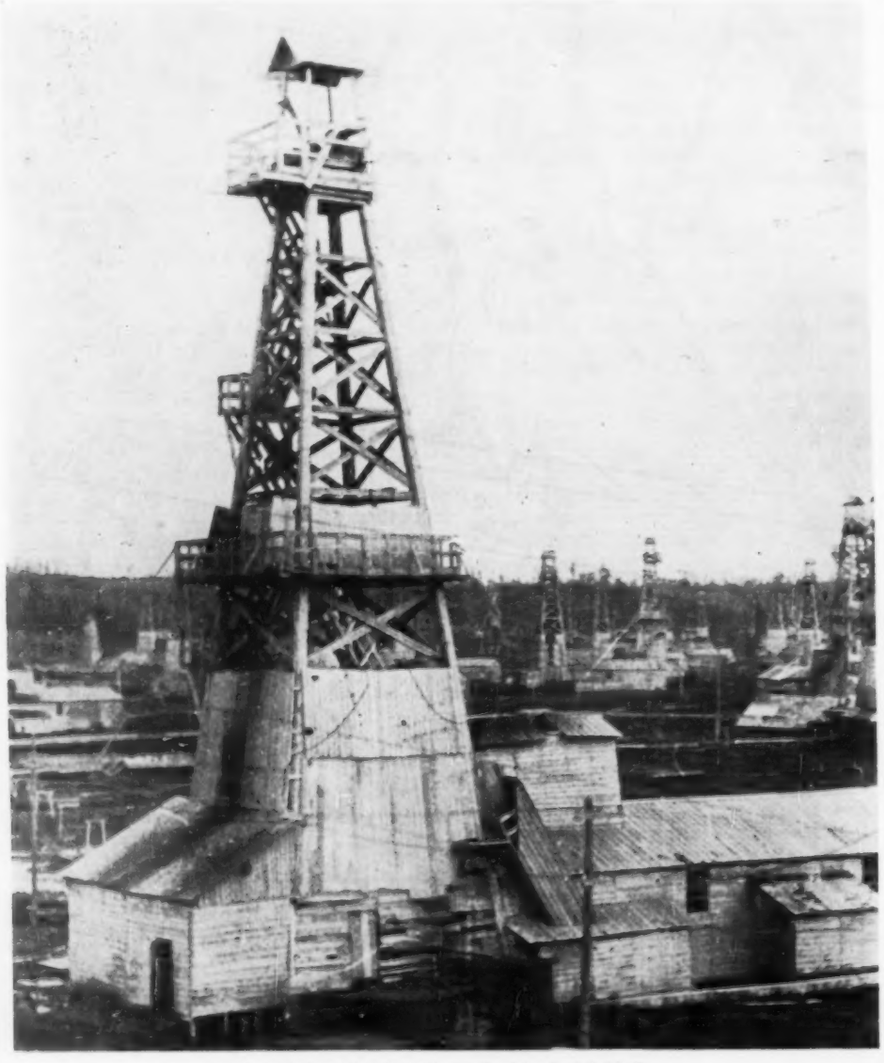
Another "advanced method," hydraulic fracturing, has so far proved to be only a costly venture. This method consists, of course, of fissuring nonporous rocks by injecting in the formation oil residues or specially prepared viscous liquids under 3,000 to 4,500 psi. It proved effective in some deposits with predominant nonporous beds at Ekhabi and Vostochny; but it failed utterly in most of Okha and Katangli deposits where semiconsolidated and friable strata are predominant. In these latter fields hydraulic fracturing results in a great agglomeration of sand in the pumping zone, cavings and blocking of the formation with sand under high pressure.

Further obstacles are caused by the clogging of the pipe column with paraffin. To mitigate this trouble, Sakhalin workers are using mechanical scrapers for the deparaffinization of the pipe, and electric heaters in the pumping zone.

Refining: Characteristics of the Sakhalin crude oil vary according to the lithology of the deposit. The gravity of the Okha crude varies between 27° and 20° API, has an asphalt base, and a sulfur content of 0.7%. The Ekhabi crude is paraffinic, of 40° API and has a sulfur content of 0.23%. The proportion of residual fuel oil, greases, asphalt and paraffin of these crudes varies between 32 and 70%; consequently, economic processing of Sakhalin oil requires cracking installations.

The greater part of Sakhalin crude is transported through pipe line into the Khabarovsk Kray, and processed in the refineries at Nikolaevsk, Komsomolsk, Khabarovsk and Vladivostok. Cumulative crude capacity of these plants amounts to 18,000 b/d while cracking capacity does not surpass 1,000 b/d. The latter figure shows that only a fraction of the crude is economically processed. The island's consumption is covered with the output of the local plants at Okha and Moskalvo; their capacity is unknown but it may be presumed that both are skimming plants.

In the Khabarovsk Kray there is also a shale-processing plant at Spassk; its liquid fuel output is too small to tip noticeably the fuel balance of the Soviet Far East.



View of the Okha oil fields on the Island of Sakhalin.

(*Continued to page 56*)

WORLD ENERGY REQUIREMENTS STUDIED AT DENVER CONFERENCE

*by Tom Dougherty**

At Denver Power Conference (left to right) are Austin Cadle, Major General L. E. Cutulla, and Fred L. Hartley, who chat on oil's place in our energy future.

Energy experts foresee ample demand to utilize oil and shale resources despite the growth of atomic and other sources of energy. Rising prices for oil and a comeback for coal are visualized.

ENERGY requirements of the world will increase tenfold within the next century, according to a paper prepared by Dr. Robert E. Wilson, chairman of Standard Oil Co. (Ind.) for presentation at a recent conference at Denver, Colo. The conference was attended by more than 200 experts in various energy-resources fields. Speakers included men in the oil, coal, oil-shale, atomic-development, and solar-energy industries.

Dr. Wilson's paper, read in his absence by John E. Swearingen, vice president, Standard (Ind.), welcomed atomic energy.

"For the long pull, it will be not a competitor, but a burden-sharer; and its ultimate availability should still the recurrent cry that we are running out of oil and that the government should therefore take us over." He continued:

"I hope that, in pointing out the lack of serious threats to other industries, I have not given the impression that I am bearish on the long-range importance of atomic energy . . . far from it. It has come in the nick of God's time to enable us to continue our burgeoning use of power without exhausting irreplaceable fossil fuels. But it will not quickly upset any important apple carts or revolutionize any major industry . . . it will rather be a matter of evolution."

Main conclusions apparent at the meeting may be summarized as follows:

(1) Petroleum will have its hands full in meeting the demands to be made upon it as the growth curve of energy requirements continues to mount. Oil need not fear inroads from atomic energy. No major realignment of the industry due to atomic energy will be necessary for more than two decades. Those areas in which atomics will make the first economic appearance will be those which oil can most profitably pull away from.

(2) The price of crude must go up during the next several years, but it has a considerable way to go before the cost curve of energy produced from petroleum crosses that of energy produced from atomic fission . . . but there will eventually be an intersection of the rising curve of petroleum cost and the declining curve of atomic-energy cost in some fields.

(3) Coal will make a strong comeback in terms of the total percentage of energy to be supplied . . . to some extent supplanting liquid and gaseous hydrocarbons in fixed-plant energy generation, later to be supplanted by atomic energy.

(4) Nonmilitary atomic generation of energy will come first in large fixed-plant installations, but these will not appear for some time on an unsubsidized basis.

(5) Solar energy receives more and more theoretical consideration, but will not, within the foreseeable future, furnish a substantial portion of ordinary energy requirements.

(6) Recovery of oil from shale is moving closer to substantial reality under present research and development work. Predictions that the capital cost per daily barrel of shale oil, and also per daily barrel of oil from coal hydrogenation, will approximate that of each daily barrel of natural petroleum sometime between 1960 and 1965 were made to sound plausible.

(7) The growth of energy demand is currently so great, and is increasing at such a rate, that the major question is not "who will supply the demand" but, rather, "how shall we, all together, be able to supply it?".

The discussion of oil shale by Fred L. Hartley, research vice president of Union Oil Co., put the shale-oil picture in economic perspective. (Union Oil has under construction a shale-oil plant near Rifle, Colo., and expects to begin operations soon.)

Dr. Hartley stressed the concept of economic reserves of shale oil, rather than the larger gross-reserve figures often heard. He estimated a 30- to 40-billion-barrel economic reserve within the Mahogany Ledge near Rifle, as opposed to recoverable reserves of 65 to 70 billion barrels often quoted for the one small member of the area's oil-shale formation. But he pointed out that such a reserve can support a 1,000,000 b/d industry for 80 years. At the end of that time economic changes will have brought other classes of shale within the economic scale.

Turning to imported oil, Dr. Hartley said that foreign oil, moving freely in international trade, will tend to delay the advent of synthetic fuels in this country. This he considered dangerous from the standpoint of national defense.

Dr. D. W. C. Schroeder, of the University of Maryland, estimated a capital cost of $9,200 for a daily barrel of oil production by 1965. He then estimated comparable cost of oil from shale at $8,000 per daily barrel within the 1960-65 period, and the cost of a daily barrel of oil from coal hydrogenation at $12,000 to $16,000.

Drawing on adjustments taken from recent cost trends, he showed the increasingly competitive position of the synthetic liquid fuels from a theoretical standpoint.

Austin Cadle of Standard Oil Co. of California, tracing the economic factors affecting oil, concluded that the growth in demand will be matched with a similar growth in production, "given a continuation of the necessary incentives." He stressed, however, that his remarks were addressed primarily to the next 20 years, and that currently unutilized sources of energy would make inroads on the present balance of supply sometime after two decades.

Speakers for atomic and solar energy likewise voiced a similar point of view. None took the point of view that the free use of fission energy is a matter for the next year or the next ten.

Generally speaking, from all points of view, speakers appeared pleased at the overall progress being made toward development of new energy sources, their conservation, and more efficient use of those now at hand, and of the inter-source adjustments to take place. This progress, they believe, will parallel the growth of demand.

No member of the oil industry was anything less than optimistic about oil's prospects. No member of the other energy industries challenged the basis for their optimism. END

* *Petroleum Information, Denver, Colo.*

CANADA FACES BUSY YEAR

With an anticipated increase of 12% or more in domestic demand and continued expansion in crude exports the output of Canadian fields may rise 33 million barrels in 1957. New wells drilled should total 3,600.

*by Leslie O. Rowland**

WHATEVER happens in the Middle East in the next eight or nine months, its impact on Canadian oil will be so slight that the growing trend evident in all branches of the Canadian oil industry is going to be carried with full force through 1957, regardless of any outside influences arising out of the closure of the Suez Canal. Two outstanding features of 1956 point the way for expansion in 1957: (1) the very strong character of the domestic market for crude oil and products, and (2) the limitations on increase in export markets, due to the size of facilities for transportation.

The export market dominated 1956 crude-oil production, and will be largely responsible for the 167,000,000 bbl (456,000 b/d average) estimated as the year's total output. This is an increase of 30% over the 129,000,000 bbl produced in 1955, and marks a new high in volume increase. Alberta produced about 140 million barrels, Saskatchewan 20,000,000, and Manitoba 6,000,000; while Northwest Territories, British Columbia, Ontario, and New Brunswick combined accounted for another million.

The export market, almost exclusively in the United States, took at least 42,000,000 bbl, in spite of the loss of 3,000,000 bbl of potential business during the strike at Anacortes. The bulge in offshore shipments in the second half of the year, out of Vancouver, helped materially to balance this loss and leave the forecast total unchanged. Compared to 1955 exports of 17,000,000 bbl, this was an increase of more than 140%, or more than 4 times the percentage increase in the domestic market for crude.

Looking at another aspect of exports, the export market amounted to 25% of 1956 production, in contrast to 13% in 1955. It was responsible for 65% of the increase in production over 1955. The most spectacular proportionate rise in export volume has been from Saskatchewan, where the newly created market in the Minnesota twin cities has permitted full production from the medium-gravity fields in the southwest for the whole year, with potential demand actually running ahead of supply. More than one-third of Saskatchewan production in 1956 went into the export market, and the pace has been maintained with completion of the Westspur pipeline from the southeastern fields.

Pacific Coast exports have also showed a very satisfactory growth, with average volume of 65,000 b/d and fourth-quarter average of close to 100,000. The coast market was influenced especially by availability of tankers for back-haul business, starting in demand growth in existing markets served by the British Columbia and Washington refineries, now averaging about 130,000 b/d, may be as much as 140,000 bbl by next spring, leaving a net surplus of as little as 15,000 bbl for additional offshore exports.

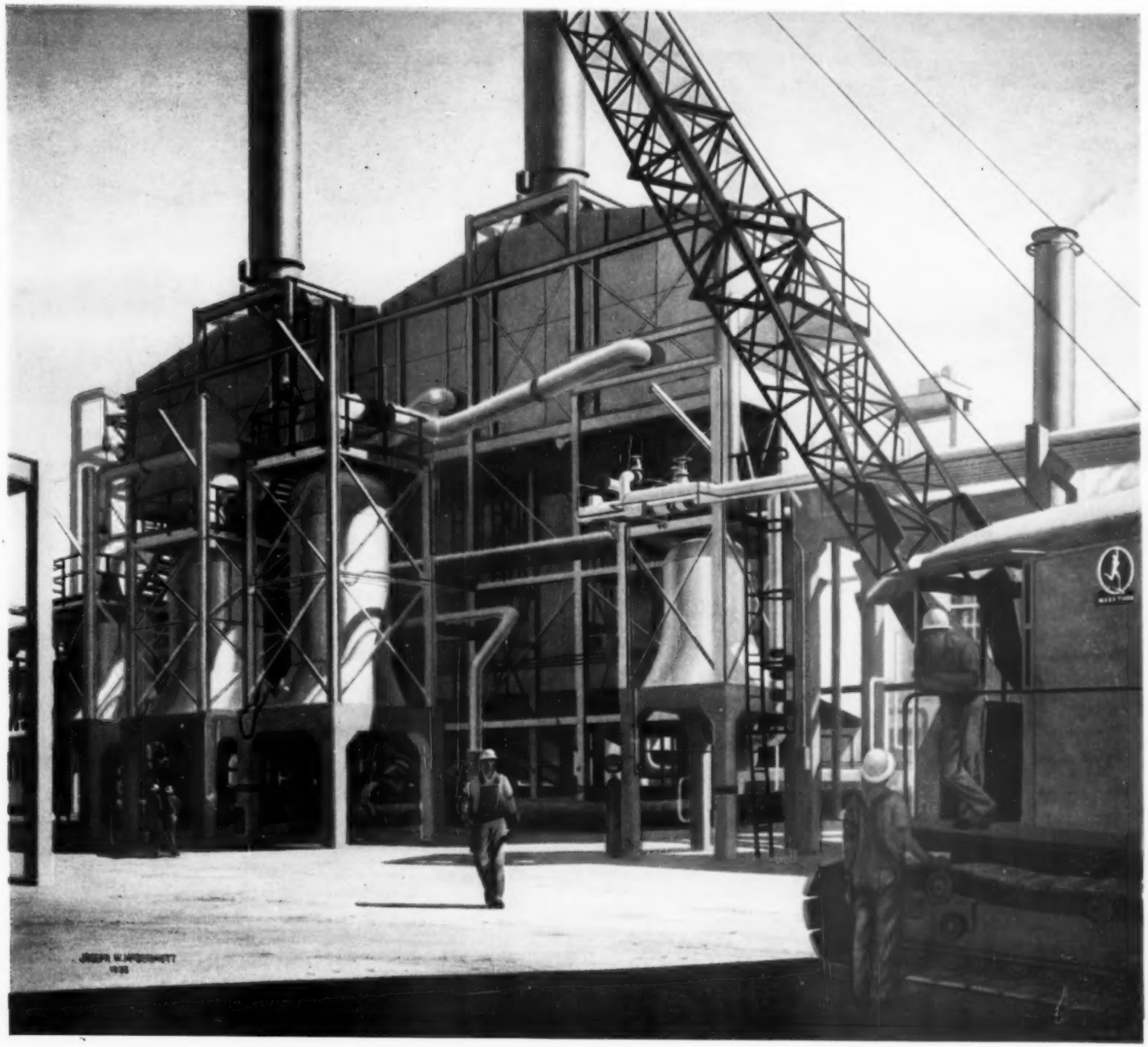
This situation makes forecasting very difficult, except to suggest that by next summer tanker tariffs are not likely to be any higher than they are now and that any reduction will reduce the competitive margin for Canadian crude accordingly. Over the long range, there are definite plans for two new refineries on Puget Sound and tentative plans for two more, all by major companies now operating in California but not planning to build any new capacity in the smog-ridden southern part of the state. None of this capacity can come into operation until 1958 at the earliest. Concurrently, Trans-Mountain plans to loop its present line with 30-in. pipe, but this pipe cannot be promised for delivery before 1958. Thus the upper limit on capacity for the next two full years appears to be in the neighborhood of 240,000 b/d to 250,000 b/d.

Forecasts of 1957 Canadian crude-oil production must take these physical factors into account. The total volume of West Coast business indicated should be about 175,000 b/d January on a small scale and reaching significant proportions by July and August, when volume of offshore shipments out of Vancouver ran to 30,000 b/d.

The fact that this offshore traffic started several months before the seizure of the Suez Canal illustrates the limitations which must be expected on rapid growth of the Pacific Coast market beyond its current 100,000 b/d rate. There are two principal limiting factors. According to California refiners, there is a strong probability that contracts with producers shipping out of Middle East countries through the Persian Gulf will be able to continue their shipments, short of an all-out war in the region. The other compelling factor is the physical limitation of the Trans-Mountain pipeline.

Trans-Mountain, according to its own officers, has a ceiling of 184,000 b/d on its throughout capacity. This will be the case until the end of next summer, when the two pumping stations now under construction at Jasper and Gainford, in Alberta, are completed. Present volume of 159,000 b/d, sustained on the average through the fourth quarter, leaves only a slender margin of 25,000 b/d for possible future volume over the next half-year. Actually, a peak of 178,000 b/d was scheduled for December. The normal for the full year. The growth of Prairie Provinces demand should create a market of 165,000 b/d in this region. The

* Editor, Oil in Canada.



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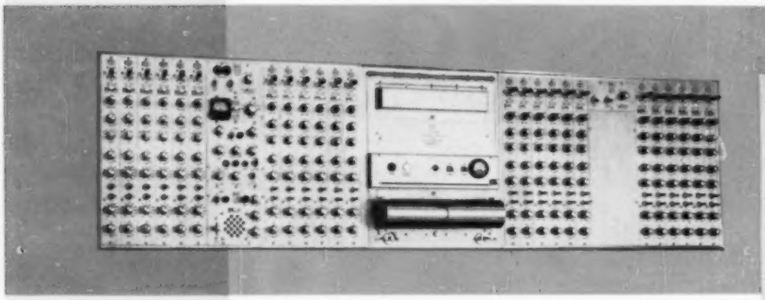

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Newly elected board of governors of the Canadian Petroleum Association. Left to right, front row: G. L. Knox, The California Standard Co., retiring chairman; R. C. Brown, president, Hudson's Bay Oil & Gas Co. Ltd., new elected chairman; T. W. C. Thomson, Texaco Exploration Co.; D. B. Tyerman, MacPherson, Leslie & Tyerman; Back row, left to right: Bart W. Gillespie, Home Oil Co. Ltd.; J. G. Spratt, Triad Oil Co. Ltd; V. H. Hunter, Imperial Oil Limited; O. I. Torkelsen, The British American Oil Co. Ltd.; Vernon Taylor, Imperial Oil Limited; G. E. Dunlap, Sun Oil Co. Missing in the photograph are: C. U. Daniels, Royalite Oil Co. Ltd.; R. A. Cruickshank, Canadian Devonian Petroleums Ltd.; C. E. Leach, Tidewater Oil Co.; W. L. Powell, The British American Oil Co. Ltd.

export market in the northern states of Minnesota, Wisconsin, and Michigan appears to offer an outlet for 70,000 b/d. Ontario, with normal rate of growth the leading figure for all Canada, can be expected to take 140,000. This all adds up to an average of 550,000 b/d, or a total of just over 200,000,000 bbl. Exports of 185,000 b/d average, or nearly 68,000,000 bbl total, will constitute more than one-third.

At this figure, 1957 production will mark an increase of 33,000,000 bbl over 1956, and a percentage rise of not quite 20%. Both items will be slightly smaller than the growth in the current year over 1955. Exports, however, will increase by 55%. The volume could be altered for the better by a substantial increase in marketings of crude in the northern states, or by utilization of the Trans-Mountain line to full capacity. At present neither factor seems likely. It must be remembered that the Interprovincial pipeline also has a bottleneck in its central section, and this tight spot cannot be removed by 1957 construction in time to have any substantial effect on the year's crude-oil movement.

Interprovincial's problem is the large and increasing volume of intermediate traffic from Saskatchewan fields into its line between Regina and Cromer stations and out again at Clearbrook, Minn., or farther east. All Saskatchewan medium crude in moving in this channel to the largest Minnesota refinery, supplemented by Alberta and Saskatchewan light crude—the latter facing a tremendous increase in its market in 1957, mostly in eastern Canada.

Interprovincial has been able to segregate its crude types as a result of the 1956 looping program, which leaves it with 3 parallel lines through eastern Saskatchewan and Manitoba. The increase in slow-moving medium crude, however, takes a disproportionate share of total rated capacity. Thus the nominal capacity of this bottleneck section, rated at 241,000 b/d, leaves little margin for any increase. Judging by November and December volume, it would appear that the central section of the Interprovincial line has spare capacity of only about 10,000 b/d to 15,000 b/d.

Interprovincial will build a 150-mile 20-in. extension in 1957, from its present terminus at Sarnia to the Toronto area where additional refining capacity of 50,000 b/d will be completed next fall to coincide with the pipeline. To serve this capacity, however, will require a substantial further loop of the western sections. How much of this program, tentatively planned for 1957 as well, can be carried out with available pipe is not yet certain. There is no doubt that, if pipe can be bought, the year 1958 will see a large increase in Interprovincial's throughput to its eastern terminus.

The indicated increase of roughly 100,000 b/d in 1957 production over 1956 emphasizes the rate at which producibility has been running ahead of markets for crude oil. From an estimated 800,000 b/d at the end of 1955, producibility calculated on the basis of authorized maximum permissive rates of production (practically MER) had grown by the end of October to 1,000,000 b/d for the 3 Prairie Provinces. By the end of 1956, it expected to be 1,100,000 b/d.

Supply-house forecasts indicate a drilling rate in 1957 even higher than in 1956, when prospective total new oil-well completions numbered 2,400 out of a probable 3,300 wells drilled. Since the 1957 drilling, like the 1956 programs, will be concentrated in the highly productive southeastern Saskatchewan group of fields and in the prolific Pembina field of Alberta, it is very likely that at least 2,000 new oil wells will be completed and producibility again should increase by at least twice the amount of production. The search for markets thus continues to be the keynote of 1957 operations, as it was in 1956.

The swing of drilling activity to Saskatchewan was prominent in 1956, and will be accentuated in 1957, according to current trends. In October, for the first time in history, total Saskatchewan well completions exceeded Alberta. For the full year 1957, they should be at least equal to Alberta's, barring some new major discovery in the Foothills Province—an event not experienced since Pembina 3 years ago. If no serious shortage of tubular goods occurs again, some 3,500 to 3,600 wells should be drilled, divided approximately 1,500 each in Saskatchewan and Alberta, and the rest in Manitoba and British Columbia. This will be about the same increase as occurred in 1956 over the 2,962 completions of 1955.

Geophysical work has become stabilized by seasonal factors in the past two years, and a steady pace of about 1,600 crew-months is on the books for both 1956 and 1957. The crews are set to work in the northern muskeg areas in winter when they can get over the ground, returning to the southern plains in the summer, with a rest period of a month for spring breakup and another month for fall freeze-up.

Refining will probably enjoy the full satisfaction of top place among all branches of the Canadian oil industry in 1957. Now completely self-sufficient in domestic operations, and debarred by economics and import duties from sending any products out of Canada, refiners can depend on the normal demand growth for their expected increase of 12% to 15% in crude runs. This past year, runs totaled approximately 224,000,000 bbl, an average of 612,000 b/d. With the total refining plant across Canada rated at 700,000 b/d and going up to at least 750,000 b/d by the end of 1957 through construction projects now under way, refiners can handle a calculated increase of 75,000 b/d to 90,000 b/d comfortably, for total volume of 248,000,000 bbl to 253,000,000 bbl.

END

GULF OFFSHORE ACTIVITY BOOMING

Ten years after the first offshore well was drilled the Gulf of Mexico is dotted with 446 drilling and producing platforms. Eighty drillings rigs are active, and completed wells are producing 200,000 barrels of oil daily.

by James W. Calvert

THE year 1957 is a milestone in the development of the offshore oil and gas industry in the submerged lands of the Gulf of Mexico.

It marks the beginning of the second decade in the unique science of prospecting at sea in an area which oil men predict will one day be the most productive in the world.

In 1947 Kerr-McGee Industries Inc. made history by drilling the first discovery well out of sight of land in the unprotected waters of the Gulf of Mexico. This was Ship Shoal A-1, drilled from a small platform erected in 35 ft of water to which was moored a tender vessel which had been converted from a wartime YF barge.

That was the beginning of an enormously expensive specialized petroleum industry which today, after 10 years, represents an expenditure of approximately $2 billion in leases, construction and drilling costs, with some 800 completions and 600 producing wells to show for it.

The coastline of the Gulf of Mexico is roughly 700 miles in length from Brownsville, Texas, to the mouth of the Mississippi River, and prospecting for oil and gas has moved to a point some 46 miles seaward in its farthest venture. Eastward of the Mississippi River, and prospecting for oil and gas has moved to a point some 46 miles seaward in its farthest venture. Eastward of the Mississippi River passes, the potential oil lands extend another 600 miles along the coast of Mississippi, Alabama, and Florida.

Producing wells have been drilled in water as deep as 100 ft, and engineers are constantly searching for methods which will enable them to operate economically in greater water depths to recover the rich petroleum reserves beneath the floor of the Gulf.

At year-end offshore production in the Gulf of Mexico ran to approximately 200,000 b/d, with 80 or more drilling rigs in operation. The US Coast Guard reported there were 446 drilling platforms and production structures located in the Gulf waters, and a survey of operating companies revealed a total of 23 mobile units in operation, with 11 more under construction; 46 drilling tenders; and 29 self-contained platforms.

Indeed, there are so many "man-made" islands out of sight of land, especially off the coast of Louisiana, that it is seldom necessary any longer to position new wells by means of electronic surveys. Landmen say they can spot more accurately locations by means of sight triangulations, since so many existing structures now are within visual distance.

A decade of progress has brought about some standardization in offshore-drilling techniques, especially in the use of the mobile platforms and submersible rigs for wildcatting.

Structures fall roughly into three categories:

First are the small platforms, large enough only to support the derrick and drilling machinery, which are tendered by nonpropelled vessels containing mud pumps, storage facilities, quarters for the crew, offices and, in some cases, complete diesel-electric units for supplying power to the drilling rigs.

These relatively small platforms, which in themselves represent expenditures of approximately three-quarters of a million dollars each, comprise by far the majority of the existing structures in the Gulf. It was from such a platform that Kerr-McGee drilled its discovery well in the Ship Shoal field, and their number is being constantly increased—in varying depths of water. If a wildcat drilled from such a "minimum" platform is a producer, then the structure is used either as a production platform or as the foundation for additional directional wells.

The second type is the so-called "self-contained" platform, gigantic multiple-well structures which provide all of the power, storage, and living facilities the floating tenders would ordinarily supply. Some of these platforms are built to drill as many as 12 wells.

The third type—and one which is increasing in popularity—is the mobile unit which can be floated to a well location, submerged for the drilling operation, and moved quickly to another location when the well has been completed. These vary in size from the submersible barge, designed to operate in comparatively shallow water, to the giants like The California Co.'s rig 55; Glasscock Drilling Co.'s "Mr. Guss";

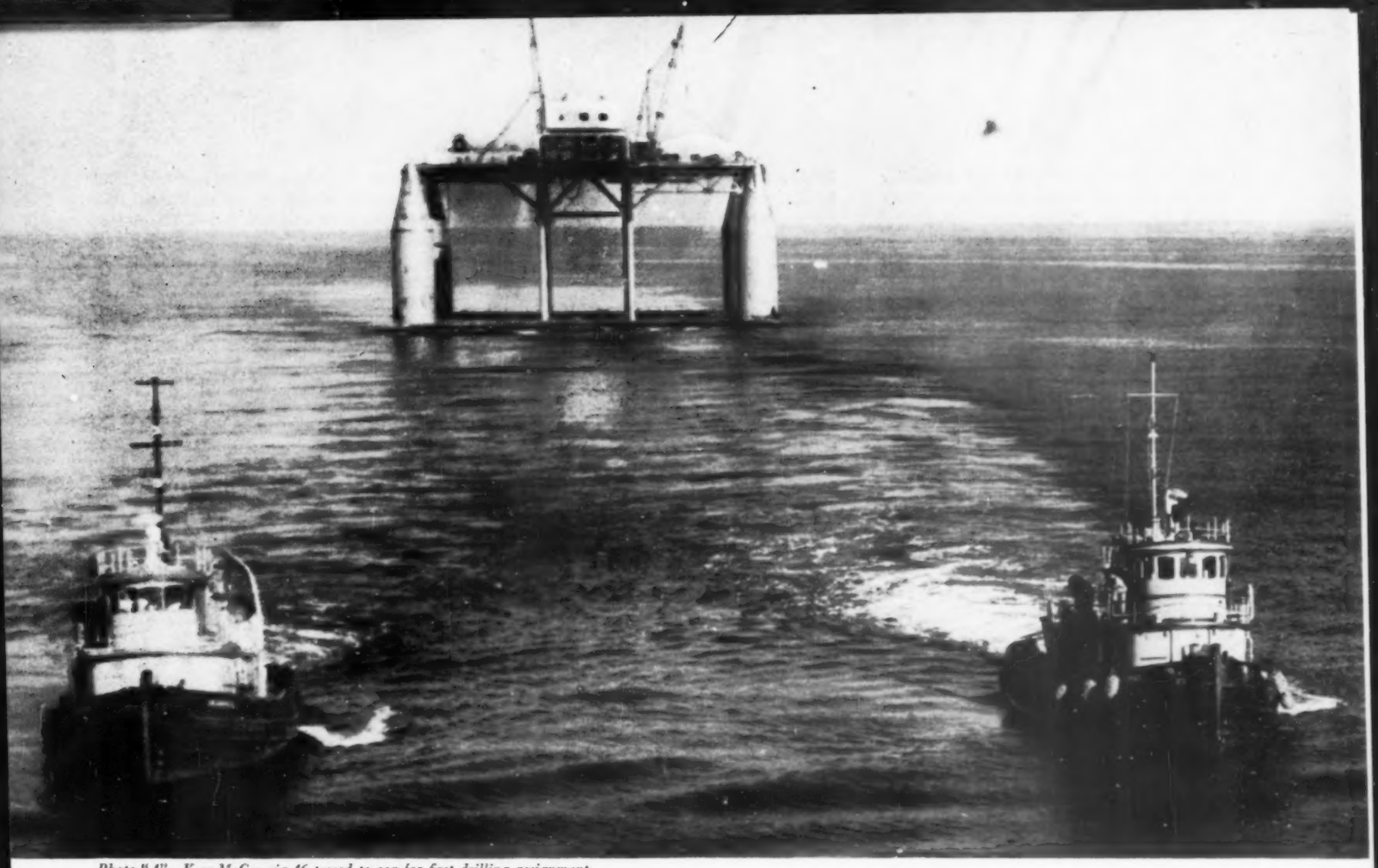


Photo "A"—Kerr-McGee rig 46 towed to sea for first drilling assignment.

Zapata Offshore Co.'s "Scorpion," Kerr-McGee's rigs 46 and 47; and The Offshore Co.s mobile platforms, some of which can drill in water up to 70 ft in depth.

Photo "A" shows rig 46, built for Kerr-McGee Oil Industries Inc. Looking for all the world like some prehistoric sea monster, it is being towed to sea for its first drilling assignment in the East Cameron field of the Gulf of Mexico. This giant submersible rig, largest floating structure in the world, is designed to operate in waters up to 70 ft in depth. The rig is under contract to the CATC group (Continental, Atlantic, Tidewater, Cities Service). Rig 46 was built at Ingalls Shipbuilding Co.'s yard in Pascagoula, Miss.

Photo "B" shows the third in line of deep-drilling barges built for Ocean Drilling and Exploration Co. The "St. Louis" is shown being towed to its first drilling location. ODECO also operates "Mr. Charlie" and the "John Hayward." All three of the submersible drilling barges were built by American Marine Corp., New Orleans, La. This barge measures 180 ft by 120 ft, and consists of a 2-story unit with drilling and storage deck, air-conditioned living quarters for 40 men, and a helicopter deck. The barge can be submerged to a depth of 30 ft, and is capable of drilling to a depth of 18,000 ft.

Photo "C" shows Delta Offshore Drilling Co.'s new submersible barge on her christening day. The 156-ft structure is bedecked with bunting at the yard of its builder, Avondale Marine Ways, New Orleans, La. The new vessel, generally similar to several already in operation, was designed by Friede and Goldman Inc., and can operate in open sea in water 25 ft in depth. It consists of a slotted hull, with an elevated drilling deck, supported by fixed columns. The vessel has a 1,000,000-lb lift derrick, drilling machinery and equipment, diesel generators, helicopter landing deck, and air-conditioned quarters for 32 men.

Obviously, the submersible units have a decided advantage for wildcatting because of their mobility. If an operator had a dry hole drilled from a permanent structure, he must either dismantle the platform or continue to maintain it even though abandoned. The operator of a mobile unit merely moves to another location in the event of a dry hole, or builds a small production platform if he gets a producer.

Of the 11 mobile units now under construction at various shipyards throughout the Gulf Coast area, at least half will be completed and in operation before the end of 1957. One shipyard made an extensive survey of the 38 oil companies now operating in the offshore areas, and found they anticipated a need for at least 144 more mobile drilling units, which cost an average of $3 million each.

It is through the operation of the mobile units that the independent drilling companies are now entering a field heretofore limited to the major oil companies because of the great costs involved in offshore drilling. Most of the independent drilling contractors who operate mobile units for the majors "hold out" a month or so of each year to enable them to drill "farmouts" on their own.

Naval architects and marine engineers believe that the average mobile unit should have a life span of about 20 years, or equal to that of a steamship. The original submersible barge, built in 1947, is still operating regularly after 10 years. Obsolesence is the greatest threat to the current crop of submersible drilling barges.

The greatest fears of the offshore oil operators were dispelled by the arrival of hurricane Flossy last September. There has always been apprehension that the oil structures would be unable to withstand a full-blown hurricane which might come roaring up from the Caribbean. Tropical storms of varying intensity have driven drilling crews to take shelter on many occasions, but Flossy was the first publicized hurricane since the storm of 1947.

Heretofore most hurricane observation has taken place on shore, or from an airplane high over the turbulence; seldom has man observed the characteristics of a hurricane on the surface of the ocean.

Flossy ripped through and did her best to tear the drilling platforms out of their foundations. They not only stayed solidly in place, but several drilling crews, who could not be evacuated in time, rode out the storm without serious injury or loss of life.

Two mobile rigs drilling in the Timbalier area off the coast of Louisiana were abandoned by their drilling crews. When engineers returned to the rigs after the storm, they found that the vibrations of wind and sea had caused the barges to sink 12 ft—straight down.

Actually, a storm which struck off the coast of Galveston in 1950 was more severe than Flossy. Drilling platforms in a relatively small area then reported winds of 120 miles per hour, but suffered little damage. The Glasscock mobile platform "Mr. Gus" weathered a local storm of hurricane intensity in 1955, when winds of more than 100 miles an hour were recorded.

But it was Flossy, striking through the center of the offshore drilling activity, who proved to oil men they had been justified in their precautions to prevent loss to property or life during storms at sea. They know, now, that their engineering estimates have been correct.

What endangered the industry far more than Flossy was the controversy between the state and federal governments over ownership of the submerged lands off the Louisiana coast. After months of negotiations between attorneys for the Louisiana State Mineral Board and the US Department of the Interior, during which all operations in the disputed area were at a standstill under injunction of the US Supreme Court, an interim agreement was reached last October 12 which permitted resumption of oil and gas activities on the outer continental shelf.

The area under dispute comprises some 5 million acres of land, or 8,153 square miles; but it is this sector which oil men believe will be the most productive of the submerged lands.

The title dispute involves a definition of the seaward boundary of Louisiana, and stemmed from passage of the submerged lands act and the outer continental shelf act by Congress in 1953. The act of the 83rd Congress quit-claimed to the state the rights, title, and interest in the so-called tidelands and limited the boundaries to not more than 3 geographic miles into the Atlantic or Pacific and not more than 3 leagues (10½ land miles) into the Gulf of Mexico.

The act further recognized such boundaries "as they existed at the time such State became a member of the union."

Louisiana claimed its historic boundary to the 27th parallel on the grounds that LaSalle claimed lands for France to that point. The Louisiana purchase of 1803 did not set out the southern boundary of the Louisiana territory, and the original boundary established by LaSalle was simply taken for granted.

The formal claim of Louisiana that it owns submerged lands to that line was established by state act No. 33 of 1954, which defined the boundary as extending to a point "three leagues" from the coast line as "officially designated and defined by bearings, lighthouses, buoys and coast objects." By this definition, the "three-league" line claimed by Louisiana extended seaward as far as 40 miles in some areas.

The US Department of the Interior, on the other hand, claimed title for the federal government to all submerged lands beyond a point three miles from the Louisiana shoreline and began leasing this area of the outer continental shelf to oil companies.

The Louisiana Minerals Board last June filed suit for injunction to prevent operations in the disputed area, and the US Supreme Court subsequently enjoined the state and Department of the Interior from leasing, pending further orders from the court.

The injunction was lifted after an interim agreement was signed, October 12, by Secretary of the Interior Fred A. Seaton and William G. Helis, Jr., chairman of the Louisiana State Mineral Board. The agreement immediately cleared the way for a resumption of drilling on existing leases, and for the resumption of leasing in the disputed zones.

[Photo "D" shows William G. Helis, Jr. (center left) shaking hands with Fred A. Seaton, Secretary of the Department of the Interior, after they signed an interim agreement to permit development of the disputed tidelands areas until the US Supreme Court decides who owns the land. Looking on are (at extreme left) Louisiana's Attorney General Jack P. F. Gremillion and (at extreme right) US Attorney General Herbert Brownell.]

Some 40 or more drilling rigs were idled during the 4 months of negotiations, but at the close of the year activity in the offshore areas had been resumed with renewed vigor.

Minerals Board Chairman Helis explained that Louisiana, in seeking to force an early settlement of the controversy, recognized a basic inconsistency in the leasing laws of the federal government and the state.

Louisiana has received an average of $100 per acre as rents for the leasing rights in the tidelands zone, while the federal government receives only $3.00 per acre as annual rentals. Furthermore, he said, it has long been an established policy of the state to grant leases with a primary term not exceeding 5 years, whereas the federal government grants 5-year leases with options to renew the primary term twice, or for a total of 15 years.

"Louisiana's position is simple and clear," said Helis. "Louisiana desired to enter into an agreement with the Federal government and with the oil companies which would protect the State and, at the same time,

Photo "B"—ODESO's "St. Louis" towed to its first drilling location.

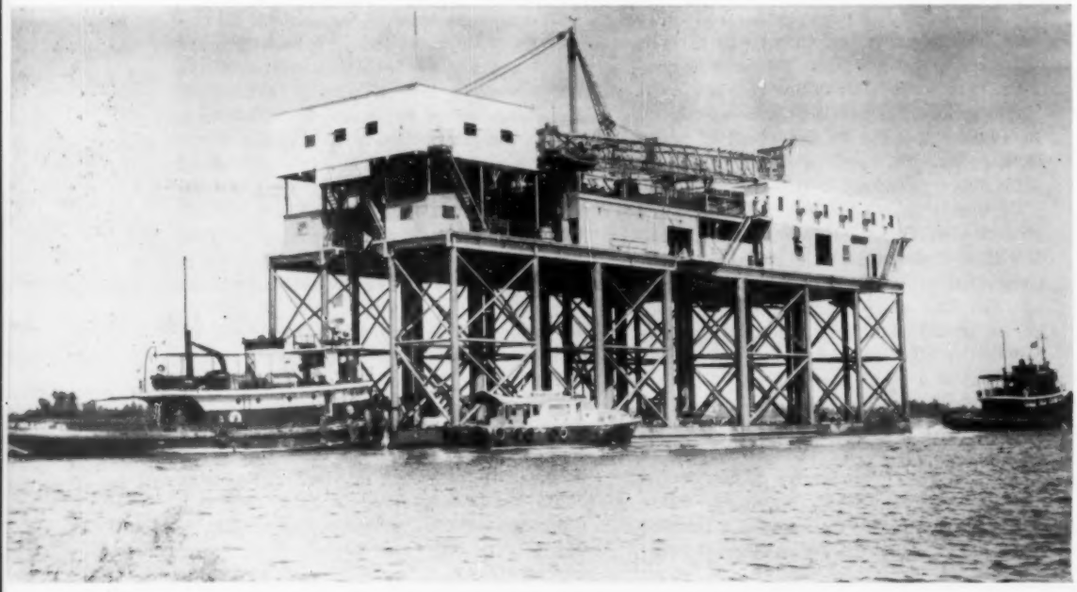


Photo "C"—Delat Offshore's submersible barge on its christening day.

would allow the companies to continue their operations in the disputed zone.

"It is essential that any agreement should give Louisiana an opportunity to collect sums which have been paid to the United States Government on any land belonging to the state, that no new leasing be allowed in the disputed area unless in compliance with Louisiana law, and that any agreement would protect Louisiana from the problem of having her lands condemned without having received any compensation.

"The disputed tidelands area must be considered as Louisiana's breadbasket and its hope for the future."

With approximately one million acres of its undisputed submerged lands under lease, Louisiana received in lease bonuses approximately $34 million from its offshore areas during the period from 1952 through 1955.

With operating cost ratios averaging some 15 to 1 over conventional drilling on land, the sea-going oil men are constantly searching for economies in an altogether uneconomical business. Although drilling methods are no different at sea than they are on land, the oil companies are striving to cut corners by designing multi-purpose equipment, such as the derrick which can double as a construction crane, or the drilling tender which can carry and assemble its own drilling unit without the aid of an expensive derrick barge. Both of these were innovations introduced in 1956.

On the drawing board is a plan to convert a LeTourneau platform into a workover rig. The LeTourneau unit is a 3-legged mobile structure with footings consisting of huge pontoons, 30 ft in diameter, which rest on the floor of the ocean. The platform is then raised by means of electric-powered elevators to the desired height for drilling. The first LeTourneau platform was built for Zapata Offshore Drilling Co., and a second is now under construction for the same firm.

It has been proposed that such a unit with a workover rig could be submerged and skidded over the top of a permanent platform to work over an existing well. Engineers estimate this operation would cut workover costs in half.

Since crude-oil storage and transportation is one of the most serious problems confronting the offshore oil operators, most of the major companies have been experimenting with the use of submerged storage batteries. In a period of bad weather it is impossible to moor a production barge alongside a platform at sea, and it is necessary to shut down the wells until the weather moderates. Under-water batteries, unaffected by surface conditions, would prevent these costly shutdowns.

Brown & Root Inc. recently introduced a radically new process in marine pipeline construction, using a rubberized asphalt mastic mixed with barite as a weight coating to replace reinforced concrete.

Under-water pipelines will float unless extra weight is added. Heretofore a thick coating of concrete has been applied on shore, the heavy joints of pipe transported to a lay barge and welded together. The new process—which is called Timcoat for its inventor, General P. H. Timothy, formerly of the US Army Engineers—is applied directly to the bare pipe on the lay barge, and thus eliminates handling of the pipe.

The first practical application of Timcoat is being used on a 27-mile gas pipeline for Southern Natural Gas Co. in the salt marshes of the Louisiana coastal region.

The Timcoat process consists of an application of hot rubberized asphalt mastic, reinforced with fiber glass. It is mixed with barite for added weight. The hot coating is wrapped with fiber glass and cooled rapidily in a water shower.

[Photo "E" shows a new process which has been developed by Brown & Root Inc. for weight coating marine pipelines. Using an asphalt rubberized mastic mixed with barite, for additional weight, the coating is applied to bare pipe as a substitute for reinforced concrete. This view, taken aboard a Brown & Root lay barge in the Louisiana marshlands, shows the coating machine at work. The new process is called Timcoat.]

Thickness of the coating can vary with the size of the pipe to obtain the necessary negative buoyancy. The process provides weights up to 230 lb per cu ft, as compared with 190 lb per cu ft for the bulky concrete-wrapped pipe. The greatest advantage of the Timcoat covering, however, is the fact that it is flexible. Concrete-coated pipe is inclined to crack or chip when the pipe bends as it moves off the end of the barge.

If the pilot operation proves successful, Brown & Root plans to build a 250-ft lay barge, especially designed for coating and laying pipeline at sea to expedite the building of a vast network of pipeline which will be needed to serve offshore wells.

J. C. Craig, who directs offshore operations for the CATC group (Continental, Atlantic, Tidewater, Cities Service), believes the greatest contribution the sea-going oil men have made to the drilling science is in the perfection of the whipstock.

Without directional drilling, it would be economically impossible to drill at sea. Most drilling platforms, and even some of the newer submersible rigs, are designed for multiple drilling.

"On shore it is simple to skid the derrick for an offset well," Craig explained. "But you can't do that when you're drilling from a platform at sea. Through necessity we have made whipstocking a fine art." END

Photo "D"—After signing tidelands agreements: Interior Secretary Seaton (center right) and William G. Helis, Jr.

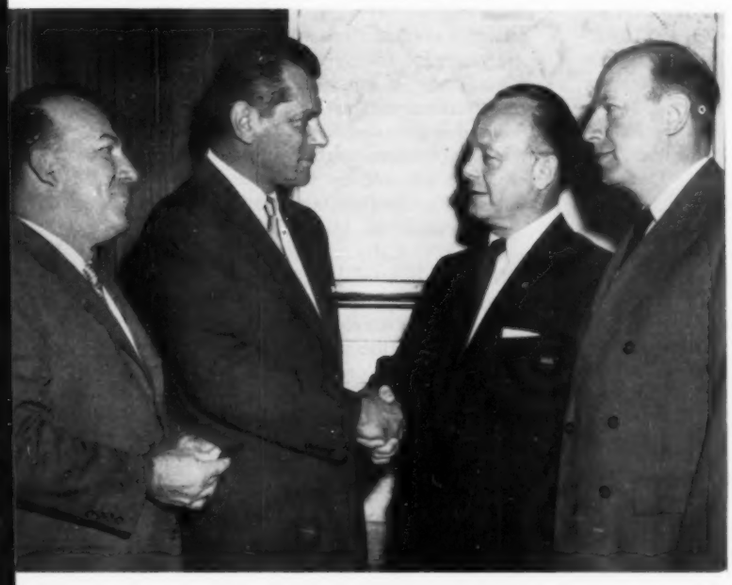
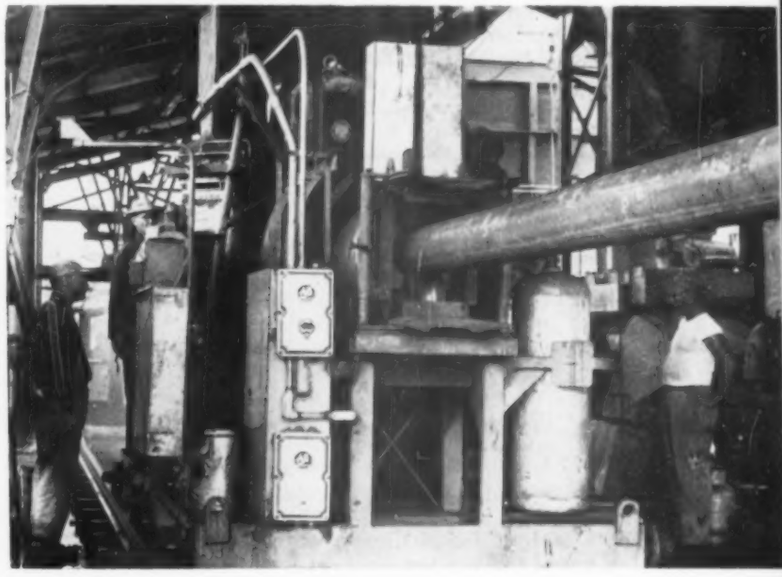


Photo "E"—Brown & Root process for weight coating of marine pipelines.



MEXICAN CONGRESS REVIEWED

by Joseph A. Kornfeld

Geologic map of southeastern Mexico prepared by Petroleos Mexicanos and display at the congress.

THE International Geological Congress held in Mexico City from September 4-11 was attended by about 3,500 scientists from the United States, Mexico, Canada, and 70 countries of Latin America, Europe, Africa, and Asia.

Sr. Don Adolfo Ruiz Cortines, president of the Mexican Republic, named the following members to the organization commission: Lic. Gilberto Loyo, secretary of the national economy, president; Lic. Luis Padilla Nervo, secretary of foreign relations, Sr. Antonio J. Bermudez, director general of Petroleos Mexicanos, and Dr. Nabor Carillo Flores, rector of the National University of Mexico, vice presidents; Ing. Antonio Garcia Roja, director of exploration, Petroleos Mexicanos (replacing Ing. Jorge L. Cumming) first secretary; and Ing. Eduardo J. Guzman, assistant director of exploration, Petroleos Mexicanos, second secretary.

Named by the organization commission on November 5, 1953 to the executive committee of the congress were: Ing. Antonio Garcia Rojas, president; Eduardo J. Guzman, Jenaro González Reyna, Institute of Geology, National University of Mexico City, secretary generals; Federico Mina U., chief geologist, Petroleos Mexicanos, treasurer; Manuel Sandoval Vallarta, sub-secretary of public education, Guillermo P. Salas, (replacing Ing. Teodoro Flores) director of the Institute of Geology, National University of Mexico; Ricardo Monges Lopez, director of the Institute of Geophysics, National University of Mexico, Manuel Alvarez, Jr., National Institute of Scientific Investigation; Gonzalo Robles, consultant general of the Bank of Mexico; Alfonso de la O. Carreno, geological consultant of the Secretary of Water Resources; David Segura y Gama, director of mines and petroleum of the Secretary of the National Economy; and Salvador Cortes Obregon (replacing Ing. Raul de la Pena) director of the National Institute for the Study of Mineral Resources.

Sra. Margarita E. de Noriega was secretary of the Congress. Ing. Santos Figueroa H., chief geophysicist, Petroleos Mexicanos, was director of technical sessions.

Five major symposia were published by the congress: Occurrence of Oil and Gas was presided over by Sr. E. J. Guzman;Occurrence of Manganese, by Sr. J. Gonzalez Reyna; Cambrian Paleogeography and the Base of the Cambrian System, by Dr. John Rodgers, Yale University; The Cretaceous System and its Worldwide Correlations, by Dr. Lewis B. Kellum, University of Michigan; and Geochemical Exploration, by Dr. T. S. Lovering, U. S. Geological Survey, Denver, Colo.

Among papers presented were the following: Cuba—Harry Wassall of Havana, Cuba, reviewed the occurrence of oil in Cuba. He said that three known oil fields have been developed from large serpentine bodies. Moreover, more than 50 oil seepages have been observed in the serpentine formation which is an alteration product of peridotite.

The entire sequence of serpentine, volcanics, and metamorphics was overthrust northward in Las Villas province for tens of miles during the post-Cretaceous to pre-Lower Eocene time internal over a normal marine limestone section.

Limestones in the underlying thrust plate are in part a facies equivalent of the volcanics in the overlying plate and contain abundant carbonaceous material. Later, tectonics folded and faulted the thrust plates and the overlying plate was eroded away in some areas and preserved in others. Where the overlying plate was preserved in grabens, oil migrated upward from the fractured limestones of the underlying plate and was trapped in the serpentine. It is believed that accumulations may exist below the serpentine in the fractured limestones.

Egypt—Abdou Shata, Cairo, Egypt, of the Geological Society of Egypt, described the geology of the Sinai peninsula of the northeast corner of Egypt. The Egyptian portion contains an area of 61,000 square kilometers, or 6% of the total area of that country. He said that the regional structure of Sinai is a low north-dipping terrace on the foreland side of a large basin.

This general terrace is interrupted in two wide regions:

a. the area north of lat. 30° N. where the terrain is crossed by a strong-folded belt of surface and subsurface structures, almost all of which exhibit a northeast to southwest direction, and

b. the western portion of the peninsula which is affected by the main "Suez Rift valley." The southeastern portion of Sinai is also affected "by the Gulf of Aqaba Rift valley."

On a structural basis, shata subdivided Sinai into four distinct areas, including: (1) the stable area of south Sinai, occupied essentially by the pre-Cambrian basement complex; (2) the semi-stable area of central Sinai which is an extensive plateau-like terrain; (3) the mobile area of north Sinai which is crossed by a series of northeast to southwest trending folds; and (4) the rift area of west Sinai, the main structure of this portion comprising a series of crescentic fault blocks which exhibit a northwest to southeast direction.

[1] *Consulting Petroleum Geologist, Tulsa, Okla.*

Japan—An unusual occurrence of crude oil was described by Koiti Suzuki of Zaimokuz, Kamakura, and Umeka Kitazaki and Hideharu Yagishita, both of Tokyo. Discussing oil accumulation in the Higashiyama field, they said that the crude oil was generated within the arkosic sandstone itself which was deposited in a fairly shallow sea containing a large percentage of organic materials.

Arkosic sandstones, tuffaceous sandstones, and dark-colored siltstones occur randomly in the form of large and small blocks. Accumulation was limited to the arkosic sandstone itself in which is found crude oil rich in paraffinic and cycloparaffinic fractions; however, no oil was found in the associated tuffaceous sandstones. However, intercalated and enclosing siltstones were found to contain aromatic and O-N-S-rich compounds with high sulfer content. Variations in lithologic facies have been clearly observed at the surface at Katsurazawa where one of the reservoirs is mined.

Peru—Victor Oppenheim described geological exploration in the upper Amazon basin of eastern Peru. He said that numerous anticlinal and synclinal folds have been mapped in the Tertiary beds of the valleys of Rio Manu and Rio Mishagua which have been affected by folding and uplift in late Tertiary time.

The region is made up of red and mottled or gray clays, clay shales, and sandstones of Tertiary age. Continental deposits of Pliocene and Miocene age outcrop in the area.

Geophysical methods of exploration are essential to determine the thickness of this vast sedimentary basis and also its potential petroleum possibilities.

El Salvador—A petroleum seepage from volcanic rocks in El Salvador was described by John C. Hazzard. He explained the occurrence of a small amount of a semi-solid asphaltic-appearing substance found as a filling in open fractures in volcanic rocks of basaltic or andesitic composition. The locality is three kilometers southwest of the village of Caroline, Department of San Miguel.

Chemical analysis shows that the material is a paraffinic oil with a high wax content. Two kilometers north of the seepage are found Lower Pliocene rocks. These are made up of interbedded sediments and volcanic rocks belonging stratigraphically below the rocks of the seepage locality.

Alaska—George O. Gates, George Grye, and Don J. Miller, told the congress that five areas in Alaska, totaling 145,000 square miles, merit principal attention for petroleum possibilities.

Southern Alaska possibilities lie in two coastal belts: (1) Cooks Inlet Mesozoic province, 750 miles long and 10 to 50 miles wide, containing a great thickness and Jurassic and Cretaceous marine sedimentary rocks; and (2) Gulf of Alaska Tertiary province, 300 miles long and 2 to 40 miles wide, consisting of marine and non-marine units exceeding 25,000 feet in maximum thickness.

In west-central Alaska, the Yukon-Koyukuk province, an area of 55,000 square miles comprises marine and non marine Cretaceous units, some volcanic rocks, and a few granitic stocks.

The Kandik province in east-central Alaska contains Paleozoic and Cretaceous sedimentary rocks.

In the province of northern Alaska, an area of 70,000 square miles exposed bedrock becomes progressively younger north from the Brooks range and includes marine and nonmarine Paleozoic, Mesozoic, and Tertiary units.

Limestone is largely limited to rocks of Paleozoic age.

Anadarko basin—B. W. Beebe, Oklahoma City, Okla., said that most of the oil and gas accumulations in the northwestern Anadarko basin are found in stratographic traps of both primary and secondary origin. The basin, he described, is a segment of a huge downwarped area, the Western Interior coal basin, which occupied a large part of the Central United States during the Paleozoic era. Areas embraced by the Anadarko basin are the Oklahoma panhandle, the Texas panhandle, and parts of Kansas, Colorado, and New Mexico.

Gulf Coast region—Dr. J. Brian Eby, Houston, Texas geologist, said that there are more than 235 known drilled salt domes in the Gulf Coastal area of the United States which extends from Mobile Bay, Ala., on the east, to the Rio Grande valley in Texas on the southwest and west, a distance of 800 miles.

This basin extends 200 miles inland from Galveston to Tyler, Texas, and 80 miles seaward from the coast of central Louisiana. Recent petroleum exploration and development on this continental shelf have revealed scores of new salt domes and billions of barrels of new oil.

Two smaller basins, the Rio Grande basin in South Texas and the central or interior basin of Louisiana-Mississippi-Alabama are located in the regional salt dome area, but the two basins show little or no evidence or connection with the coastal basin. The Tyler basin of East Texas, although a separate entity, indicates direct connection with the coastal basin.

Sediments overlying the buried salt beds exceed 35,000 feet in thickness at or near the deepest part of the basins.

Technical sessions—Papers presented to the congress were divided into 15 principal sections as follows:

(1) Volcanology of the Cenozoic; (2) The Mesozoic of the Western Hemisphere and its worldwide correlations; (3) the geology of petroleum; (4) the geohydrology of arid and sub-arid regions; (5) relations between tectonics and sedimentation; (6) modern ideas on the origin of mineral deposits (metallic and nonmetallic); (7) paleontology, taxonomy, and evolution; (8) plutonic rocks, their origin and relationship to tectonics; (9) applied geophysics; (10) micropaleontology; (11) petrology, geochemistry, and geology of isotopes; (12) the genesis of ancient and modern reefs (bioherms and biostromes); (13) geology applied to mining and engineering; (14) marine and submarine geology; and (15) diverse problems of general geology.

Twelve other technical meetings were held concurrently with the congress at Mexico City as follows: (a) Association of African Geological Services: F. Dixey, South Kensington, London, president; (b) Commission for the International Geological Map of Africa: F. Blondel, Paris, general secretary; (c) International Paleontological Union: H. Termier, Paris, president; (d) Society of Economic Geologists, Francis Cameron, New York, N. Y., president; (e) International Commission on Stratigraphy: R. C. Moore, Lawrence, Kans., president; (f) Commission for the World Geologic Map: F. Blondel, Paris, secretary; (g) Commission for Authors' Abstracts: F. Blondel, secretary; (h) Commission for the Correlation of the Karoo System (Gondwana): H. S. Haughton, Pretoria, South Africa, president; (i) Commission on the Earth's Crust: Paul Fourmarier, Liege, Belgium, president; (j) Commission for the Spendiarov Prize: D. I. Scherbakov, Moscow, U.S.S.R., president; (k) Commission for the Geological Map of Europe: A. Bentz, Hanover, Germany, president; (l) International Committee for Clay Studies: Ralph E. Grim, Urbana, Ill., U.S.A., president; William T. Bradley, Urbana, Ill., U.S.A., secretary. END

Principals at the opening of the 20th International Geological Congress in Mexico City at the National auditorium, from left: Charles Jacob, president of the 19th session held in Algeria in 1952; Sr. Luis Padilla Nervo, secretary of Sr. Gilberto Loyo, secretary of the national economy of Mexico and president of the organizing committee of the congress; and Antonio Garcia Rojas, director of exploration for Petroleos Mexicanos and president of the executive committee of the congress.

Despite almost complete destruction during World War II due to Allied bombing and Japanese "denial" practices, the Lutong refinery has been restored and capacity has been raised from slightly over 7,000 b/d before World War II to about 46,500 b/d at present.

LUTONG REFINERY RESTORED

LUTONG Refinery, Northern Sarawak, British Borneo, serves both the diminishing field at nearby Miri (1,400 b/d) and the 115,000 b/d field at Seria, 40 miles along the coast in neighboring Brunei State. About half the combined output of the two fields is processed at Lutong: the balance is exported by the refinery in crude form.

Pipe lines link Miri and Lutong, and Seria and Lutong, in the latter case running along a coastal sand road and crossing numerous jungle rivers en route.

Miri is the senior oil field in British Borneo, and was discovered by Shell Group geologists in 1909. Drilling began in 1910, and the first export of oil was (about 3,500 bbls.) crude shipped in 1913 from a tank group set up in the oilfield itself.

Lutong refinery was established in 1917. It was on the coast four miles from Miri oilfield, because this was the nearest point to Miri field where a three to four mile long "rentis" could be cut inland into the jungle to accommodate a light railway upon which sea loading lines could be assembled.

The South China Sea is shallow around British Borneo's coast, and at Lutong tankers must lie at moorings three miles offshore to take aboard their cargoes. The refinery had therefore to be positioned where sea-lines could be easily assembled on land, because the corrosive tropical sea makes their replacement necessary fairly frequently.

Lutong's first crude distillation unit was Trumble 1. A second unit, Trumble 2, was started up in 1921, and a third, Trumble 3, was built in 1923/24. Trumble 1 was demolished in 1927. No additional crude distillation units were built prior to World War II, but a number of small units for refining the distillation products and for meeting growing local demands were erected. These included a lubricating oil recovery unit, an asphalt plant for the production of bitumen, and a kerosine refining plant.

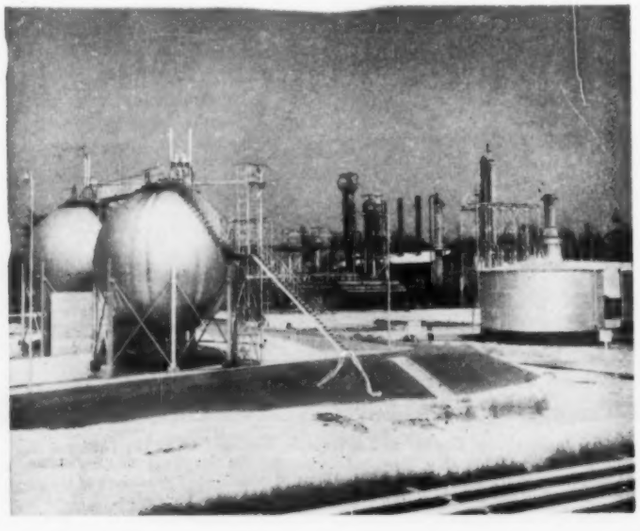
Seria field was discovered in 1927. Well 1 was drilled in 1928, and by 1931 Seria was producing on a commercial scale and was linked with the refinery by the coastal pipelines which link Miri-Seria-Lutong referred to above.

In 1941, when the Japanese occupied British Borneo, Lutong refinery's throughput was on the order of 24,000—27,000 bbls. per day. In 1940, the last complete prewar year of operation, Seria produced 17,612 b/d of crude from about 150 wells. Miri produced 3,000 b/d that year (having declined from its peak, 15,200 b/d, in 1929.

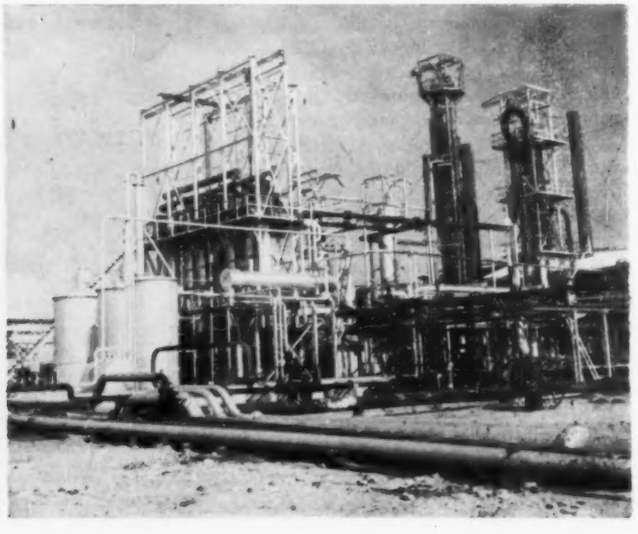
The bulk of Lutong's equipment was destroyed before the Japanese arrived, but after some time the invaders managed to rehabilitate one of the Trumble units, which they operated intermittently for the duration of their three and a half years' stay. The products, however, were used for local consumption only. The Japanese exported about one million tons of Miri and Seria oil in crude form.

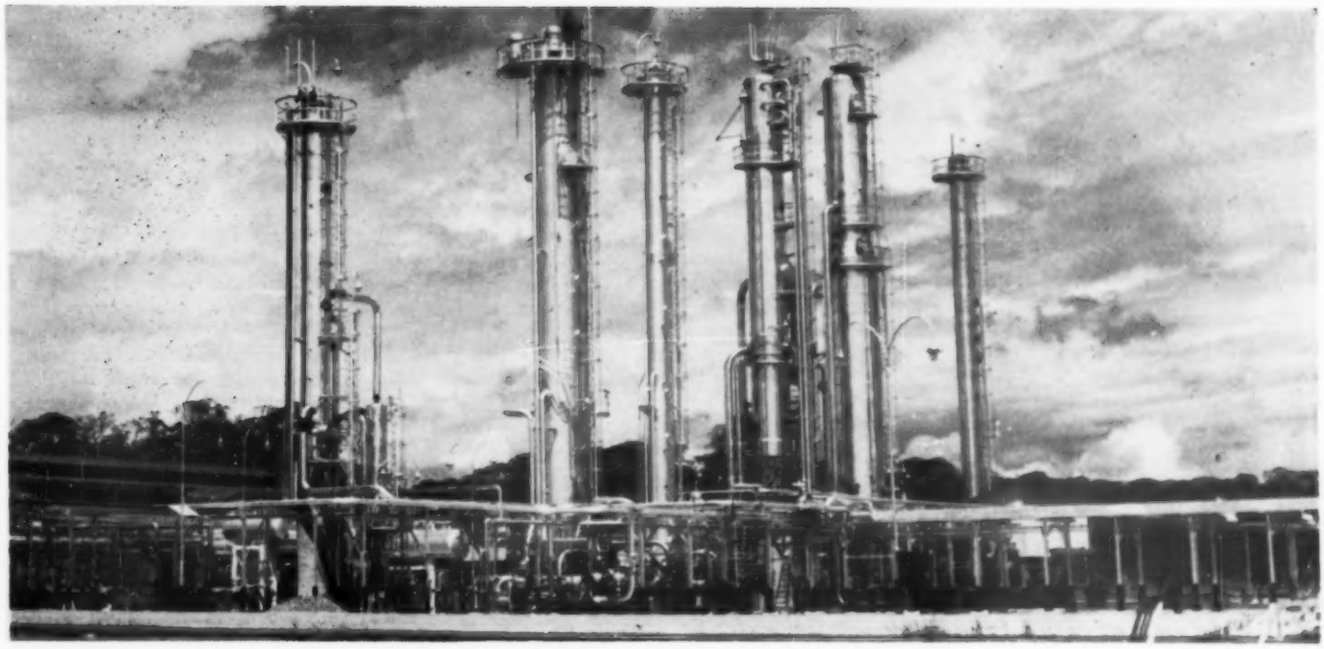
The second Trumble unit was rehabilitated by the Japanese late in their occupation but it was destroyed by an Allied bombing attack on the day before a large public ceremony was to be held to mark its reopening.

Hortonspheres at Lutong refinery, Northern Sarawak, with distillation units in the background.



Trumble distillation unit at Lutong refinery, Northern Sarawak.





Gas absorption plant at Seria, British Borneo.

The end of the Japanese occupation found Lutong refinery very badly damaged, both from Allied bombing and from Japanese denial measures. Both oil fields, too, had been "denied," and the interval between the Japanese capitulation and the resumption of oil production was used to rehabilitate the refinery.

An unused Lummus crude distillation unit built originally for the American War Department was obtained and erected at Lutong. It had in the first instance been shipped in packaged form for establishment on some Pacific oil-bearing island, to shorten the Allies' supply lines.

The Lummus plant was erected at Lutong, and came into operation on Christmas Day, 1946. The wreckage of Lutong's Trumble units was picked over, and one complete unit was assembled from the pieces. This began operations in 1947.

Throughput at Lutong in 1947 was 21,700 b/d. Modification of the same basic equipment raised the throughput to 37,500 b/d by 1950 and to 46,500 b/d in 1954 and 1955.

Early in 1955 a deisobutanizer was brought into service to process natural gasoline which by then was being produced by an absorption plant newly built at Seria.

Lutong's main products are gasoline, three types of diesel fuels, a fuel oil component and naphtha and isobutane. The gasoline, diesel fuels and fuel oil component are exported to Singapore, while the isobutane is blended with the naphtha and shipped to another Shell Group refinery for further processing. Untreated crude in excess of the refinery's capacity (Seria and Miri today produce about 117,000 b/d between them) is shipped to refineries in Australia, Japan, the, U.K. and elsewhere.

A new sea-loading pump station came into operation in October 1955, with a maximum loading rate (using two sea lines) of 8,250 bbls. per hour. There are four loading berths: two for loading crude, one for residue, and one with a white oil loading line and a bunker loading line. The bunker line is extended to the two crude-loading berths, and since the residue line can also be used for bunker fuel it is possible to bunker ships at all four berths.

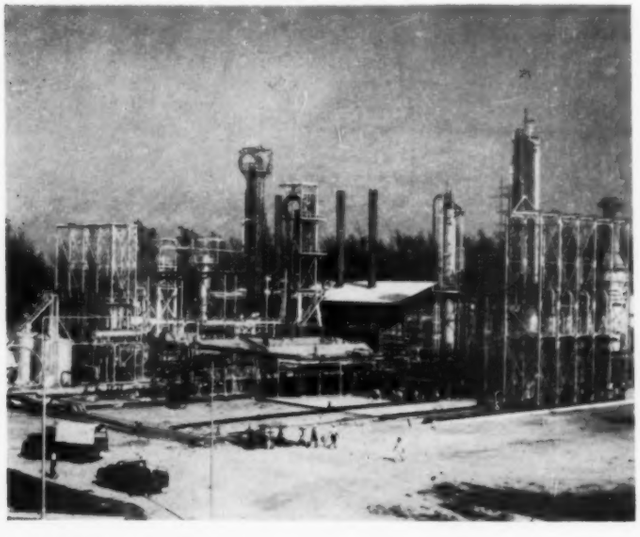
In addition to its export activities, Lutong produces about 7,100 barrels a month of gasoline and diesel fuel to meet local market requirements, and the needs of the refinery itself and Miri field.

Lutong occupies about 132 acres. Plans for its future development include the erection of a gasoline stabilizer in 1957, and the extension of its electric power house to provide current for the electric pumping of Miri's surviving 180 wells.

A gas absorption plant was opened at Seria oilfield, State of Brunei, on Feb. 21, 1955, to produce about 1,400 bbls. of natural gasoline per day from oil field waste gas. A small section of this five-acre plant operates as a refinery to provide Seria field and neighboring commercial users with gasoline and high speed diesel fuel.

The gas plant represented the first introduction of refining processes into Brunei State, and freed the oilfield area of Brunei from dependence upon Lutong for its motor fuel. END

Distillation units at Lutong refinery, Northern Sarawak: Trumble unit on the left, Lummus on the right.



Lutong refinery launched a replacement sea-loading line in May, 1956. The line is seen in the picture snaking out to sea in charge of tugs

Oil in the Soviet Far East

(*Continued from page 42*)

The processing capacity of this area is below the current Sakhalin production rate, and this discrepancy will worsen in the years ahead. From Sakhalin, Russia exports to China only minute quantities of diesel fuel but hardly any crude oil. It is thus logical to assume that additional plant capacity will be built in this area in the near future in order to bring its total intake capacity to the planned crude production.

Economics of Sakhalin Oil: However great the difficulties that mar its exploitation, and however modest production, Sakhalin oil is vital for the supply of the Soviet Far East and Pacific Coast. Present production is insufficient to cover the oil needs of this area and the shortage will continue also in the foreseeable future. Production targets set by the current Plan are modest: whereas drilled footage must be trebled by 1960 as compared with 1955, production is expected to rise by a mere 50% during the same period.

The rising consumption caused by industrial, military and transportation activities of Russia, China and North Korea in this area requires additional supplies of oil products that are transported overland or shipped from the Black Sea ports. High transportation costs increase the price of oil products by as much as 60%. This constitutes a premium which makes it advantageous to develop the costly Sakhalin deposits.

This situation may be slightly altered when the projected pipe line from Irkutsk to Khabarovsk is completed: it will carry oil products from the Irkutsk refinery along the Yuzh-Sib railway to Khabarovsk Kray. However, the pipe line connecting Second Baku with Irkutsk itself will not be ready before 1960; and that goes for the planned expansion of the Irkutsk refinery as well. Consequently Sakhalin oil production will continue to be protected by this high premium in the future. END

British Viewpoint

(*Continued from page 34*)

There were differences of opinion in the UK and France regarding the commencement of this expedition, but it is now generally agreed that only the timing was at fault, i.e., it should have started earlier and, once started, should have been continued to a finish.

When this halt was called, it had the immediate effect of raising Nasser's capital stock and, more to the point, his egoism; he, therefore, proceeded to sabotage the Suez Canal by sinking various obstructions in it, 51 in all, and by blocking it to shipping for some time. British oil men strongly express the opinion that, if the USA had come down on the correct side, the canal would never have been blocked, the flow of oil for the world would not have been interrupted to the extent it has—and, also, it would have had such an effect on Arab opinion that the sabotage of the Iraq Petroleum Co.'s pipelines in Syria would have been avoided, and that the denial of Saudi Arabia's oil, to French interests at least, would not have happened. The denial of this oil to British interests probably could not have been avoided, as King Saud holds animosity to Britain (through the trouble about the Buraimi oasis, among other things) and is rumored to have been using oil royalties in financing propaganda against the United Kingdom.

Now that emergency steps are being taken to supply the European oil shortage and steps are being taken to restore the traditional good relations between the two nations, it is the hope of British oil men that differences between the USA and the UK soon can be equitably and amicably settled—leading to a resumption of full petroleum activities in the Middle East, so that further chaos will not develop and Russia gain a footing there—thus widening the breach between the English-speaking peoples. END

British Admiralty

(*Continued from page 35*)

gained in quick clearance of blocked harbors during the last war, when they did excellent work in northern Europe. They are vessels designed for war where the quick removal of blocks, to form an effective channel into a captured port, may well decide the outcome of land operations. This type of ship is not built for commercial purposes where the market demands ships for deep-sea salvage rather than those equipped for heavy lifts in shallow water. Coastal salvage vessels, therefore, are only obtainable from Admiralty sources. Seven of them were at Port Said early in December, with two more following at the end of the month.

British naval lifting craft are of 3 types: 1,200, 750, and 600 tons each. They work in pairs, and are operated by passing 9-in. wires under the wreck, which are then secured to the lifting craft on each side. The lifting craft are flooded down by filling their tanks with water; the wires are secured taut; and the tanks are then pumped out at low water. This supports the wreck in the bight of the wires; and, as the tide rises, it is lifted off the bottom and can be towed away. If there is no tidal rise, wrecks of reduced weight can be lifted using the buoyancy of the lifting craft alone. Five lifting craft of various types were at Port Said early in December, with two more at Aden. Another two will reach Port Said by the end of the year.

Coastal salvage vessels and lifting craft, together with their trained crews, are considered to be the key ships in the operation of clearing the canal.

As well as numerous salvage pontoons and tugs, other British forces in Port Said early in December included ocean salvage vessels, boom (defense) vessels, wreck dispersal vessels, and survey vessels.

The ocean-going vessels are completely self-contained for long periods—with stores, pumps, air compressors, workshops, and much other salvage equipment. Their primary use is for major salvage operations in ship fires, strandings, collisions, and sinkings in distant areas where external patching, coffer-damming, pumping, or compressed air may be required. They form an essential part of a balanced salvage force in the canal for dealing with wrecks such as "Paul Solente." Three were available in December.

The boom (defense) vessels are normally employed on the laying and maintenance of boom defenses and on mooring work. However, when supplied with suitable salvage equipment, they can be employed as miniature coastal salvage vessels with a 70-ton lift. They are particularly useful for laying out ground tackle for salvage operations. Eleven were available in the vicinity of Suez early in December, as was one wreck dispersal vessel carrying large quantities of depth charges and other explosives for blowing down a wreck in order to give an adequate depth of water for safe navigation. One survey vessel was on hand to survey wrecks, mark channels, and take soundings. The Admiralty pointed out that such an extensive salvage fleet of 35 British ships forms a well-balanced and unique force, equipped and ready to carry out the job. Less than a quarter of this force opened Port Said and unbarred the way to the sea for some of the ships in the convoy trapped in the canal. The Admiralty suggested that, if the channel is to be cleared throughout in the minimum time, it is certain that extraordinary forces such as ours must be deployed rapidly to get to work upon those eleven blocks which are effectively obstructing the channel.

World Crude Output

(*Continued from page 39*)

some sabotage of facilities by malcontents. Egyptian influence is important in Kuwait, as it is in other Persian Gulf sheikhdoms, where schools are largely manned by Egyptians. Average production from Kuwait for 1956 was about 1,075,200 b/d, a slight drop from the 1955 record of 1,091,800 b/d. During peak lifting periods, Kuwait fields produced well over 1,200,000 b/d.

PERCENTAGE DISTRIBUTION OF WORLD CRUDE PRODUCTION

Principal Countries	1955	1956	Fourth Quarter 1956
USA	44.2	43.2	44.2
Canada	2.3	2.8	3.3
Mexico	1.6	1.5	1.6
Venezuela	13.8	14.7	15.7
Romania	1.4	1.3	1.4
USSR	9.2	9.5	10.3
Iran	2.1	3.3	3.8
Iraq	4.5	3.9	2.4
Kuwait	7.1	6.5	4.9
Saudi Arabia	6.3	6.0	5.1
Borneo	0.7	0.7	0.8
Indonesia	1.5	1.5	1.6
Principal Areas			
North America	48.0	47.5	49.0
South America	16.2	17.0	18.1
Europe (Incl. USSR)	12.0	12.5	12.6
Middle East	21.3	20.5	17.6
Asia & Australia	2.5	2.5	2.7
Western Hemisphere	64.2	64.5	67.1
Eastern Hemisphere	35.8	35.5	32.9

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International News and Notes

Reparations Affect Austrian Oil

Development of the Austrian oil industry is still being hampered by unsolved problems of the two Vienna Memoranda, according to the Austrian Inst. of Economic Research in its latest report.

Although the deadlines are coming nearer for the execution of the two Vienna Memoranda (French: January 27, 1957, British, American: April 27, 1957) which are to regulate the claims of western firms to the Austrian oil industry on the basis of the 1955-State treaty, low-level talks just begun with the French already revealed diverging interpretations on the memorandum.

Meanwhile unclarified ownership rights in the oil industry have resulted in a slowdown in exploration activity and in investment which, in turn, have lead to a decreasing crude production for about nine months. The lower the crude production, the greater the percentage reparation deliveries to the Soviet Union occupy in total crude production. Although reparations in 1955 were about 27% of total crude production, they rose to 30% in 1956.

Tanker Sea Loading Off Nigeria Coast Studied

HMS "Owen," an admiralty survey vessel is seeking the feasibility of tanker loading by sea-loading line off the eastern delta of the River Niger. Shell-BP Petroleum Development Co. had reported promising oil shows at Gloibiri, and is now drilling. This later development would indicate the report on Gloibiri was conservative.

Anglo-Egyptian Oilfields Ltd.

Shareholders in this company have been informed that a military proclamation has been issued in Egypt providing for the sequestration of the company. Shell and BP own 60% of the share capital and private British interests hold a further 6%. Management and control have been in Egypt since 1951. The issued capital is £5,665,-500 in £1 shares.

Kum Well Shut In

National Iranian Oil Co.'s well at Kum has now collapsed and closed itself down. The first signs of this collapse came when flow through the beans began to decrease without increase in pressure. The size of bean was gradually reduced without increase in pressure and then suddenly all flow ceased.

Preparations are now being made to drill a new directional well, aiming at the bottom of the first well, and also to erect tankage and install pipelines so that the productions of the future wells can be taken care of.

Sahara Discovery

Oil and gas in quantity has been struck by the State company Societé Nationale de Rechèrche de Pétrole along with an associate Compagnie Française des Pétroles d'Algérie at Haissi Messaoud, 60 miles southeast of Ourgla, South Algeria. Arrangements are being made for the laying of a pipeline to the coast. It is estimated that the total production of the field will amount to about 100 million tons.

Nahorkatiya Expansion

Proved and probable resources of the Nahorkatiya field in northeast India are sufficient for a yield of about 50,000 barrels of crude and 45 mmcf of gas per day. There were 16 producing wells at the beginning of last November. The latest well completed at that time was put down to 10,139 ft in 27 days.

The government of India has appointed a committee to select a refinery site to process the Assam oil.

Ketjen Catalyst

Messrs. Ketjen, Amsterdam, Holland, have developed a new desulfurization catalyst, which is marketed under the tradename "Ketjenfine." It is a cobalt-molybdenum catalyst on an alumina carrier, and is supplied in pellet form 1/8-in. to 3/16-in. diameter. The new high-activity catalyst is also useful for the removal of nitrogen compounds. The company will begin manufacturing platinum catalysts in the near future.

Showa Builds New Refinery

A new 40,000 b/d refinery is being built at Yokkaachi, about 50 miles from Nagoya in Japan, by the Showa Oil Co., a subsidiary of the Royal Dutch-Shell group. To help finance this new building, the Anglo-Saxon Petroleum Co. has made a loan of £8,793,750 (nearly $25 million) which will be repaid at 6.3% of the principal per year, commencing when the refinery goes onstream or in January 1959, whichever date is the earlier.

Possible Matzen Extension in Austria

Spannberg No. 3 (Lower Austria province) since September 16 has been producing 20 metric tons (about 150 b/d) of high gasoline-content paraffin-base crude from 6,628-6,726 ft. Finding of oil in this area may indicate extension of the Matzen field, 1.5 miles away. To define No. 3's northerly limits, Spannsberg No. 4 has been drilled to a present depth of 5,578 ft.

Pipeline Project for Europe

A recently formed Dutch company called Sappeur, according to F.A.C. Guepin, a managing director of the Royal Dutch-Shell group, is to make a detailed survey for a pipeline to run from Marseilles to Cologne and Rotterdam, with branches to other centers.

Soviet Tanker Launched

The Soviet shipbuilding and repair plant in Odessa (Black Sea) recently launched a 13,000 dwt diesel-electric tanker, the "Ural."

Australian Crude Supply Threatened

Crude-oil supplies for Australian refineries from the Middle East are not yet believed to be seriously in jeopardy, as most supplies do not travel through the Suez Canal. However, the British Petroleum refinery at Kwinana. WA, would probably be affected first, and a spokesman for the Kinwana Oil Refinery has said that the Suez crisis could quickly affect the refinery. "It is reasonable to assume that if the Suez Canal is closed to world tanker traffic and the tankers had to be rerouted around the Cape, this might cause a tonnage shortage."

Of 1,600,000 tons of petroleum products imported by Australia each year, 688,000 tons come from Persia, 97,000 from Saudi Arabia, 23,000 from Bahrein, and 81,000 from other Middle East countries. The balance is supplied mainly by Borneo and Western New Guinea.

Halliburton Enters Austria

Halliburton Oil Well Cementing Co., of Duncan, Okla., recently obtained permission from Austrian Mineral Oil Administration to conduct its patented well-servicing operations in Austrian fields.

30 Wildcats in Czechoslovakia

Geophysical work in the Vienna basin is expected to result in the drilling of 30 exploration wells this year in the Brodske, Petrova Ves, and Stepanov regions where prospects appear most favorable. Geophysical work has also been conducted in the East-Slovakian regions of Albinov, Malcice, and Trhoviste. Oil shows are reported near Cifer, in the Trnava district (southwest Slovakia), and oil prospects are reported at Bernolakovo and Senec.

Admiral Ben Moreell, chairman of Jones & Laughlin Steel Corp (right), cuts a "ribbon of steel"—a section of J & L wire rope—at official opening of the new $1,700,000 headquarters building of Jones & Laughlin Supply Division, in Tulsa.

J & L Supply Has New Tulsa Headquarters

Jones & Laughlin Supply Division formally dedicated its new $1,700,000 headquarters building and supply store early last December in one of Tulsa's recently developed industrial areas. Admiral Ben Moreell, board chairman for the parent J & L Steel Corp., officially opened the building by cutting a strand of J & L wire rope.

Lowd Export Manager for National Tank

Judson D. Lowd has been appointed export manager for National Tank Co., Tulsa. Mr. Lowd's background includes association with Parkersburg Rig and Reel, Oil Field Equipment Sales, etc. He will have offices with National Tank's export agent, The National Supply Co., export division, in New York.

Atlas Acquires El Dorado Refining

Petro-Atlas Corp., wholly-owned subsidiary of Atlas Corp., will buy a controlling stock interest in El Dorado Refining Co., El Dorado, Kans.

J. E. Jonsson (right) officially turns over new Houston Technical Laboratories to its president, Robert W. Olson, at opening ceremonies. Mr. Johnson is president of Texas Instruments Inc., HTL parent.

Seismic Research Center for Houston Technical Lab

The main plant of the Houston Technical Laboratories, a subsidiary of Texas Instruments Inc., formally was opened recently to house the research and manufacturing facilities of one of the world's largest producers of seismic exploration equipment and electronic instruments. Co-founders of the seismic exploration method, Eugene McDermott (TII board chairman) and Dr. J. C. Karcher (president of Concho Petroleum Co.) were on hand to lead the ceremonies—assisted by Cecil Green, board chairman of Geophysical Service, Inc., of which Texas Instruments is an outgrowth.

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Dresser Organizational Executive Changes

Reorganization of top management has been announced by J. B. O'Connor, president of Dresser Industries Inc. Mr. Doyle Miller has resigned as operating vice president of Dresser to enter offshore drilling contract field. Hector P. Boncher, operating vice president, will be in charge of Dresser's heavy machinery division. Henry Herzig has been appointed operating vice president in charge of Lane-Wells Co., Well Surveys Inc., and Ideco here, as well as Security Rock Bits Ltd., in England. Otto Hammer, formerly president of Security Engineering now becomes operating vice president of Dresser Industries Inc. He will be in charge of the Guiberson Corp., recently acquired by Dresser, and Security Engineering Co. operations.

Gordon G. Guiberson has been elected to the board of Dresser Industries Inc. He is president of Guiberson Corp., Dallas, a leading manufacturer of oil tools and molded rubber products for oil-well drilling and production. Assets of the Guiberson Corp. were acquired by Dresser in August 1956, for a reported consideration of approximately $10 million in Dresser common stock. At the time, Mr. Guiberson agreed to remain as president of the Guiberson corporation.

Robert H. McLemore, formerly director of oil-well services for Dresser, has been appointed vice president and general manager of the new turbo-drill division of Dresser Industries Inc.

Plan Products Line

The Ohio Oil Co. will build a common-carrier products pipeline from Wood River, Ill., to Chicago. The line, with an ultimate capacity of 90,000 to 100,000 b/d, will serve to alleviate the bottleneck through the Alton, Ill. locks during low-water periods in the Mississippi and Illinois Rivers.

Standard of Indiana Buys Rights to New Oxidation Process

Standard Oil Co. (Indiana) has been granted worldwide exclusive rights to a new hydrocarbon oxidation process developed by Scientific Design Co. Inc., New York. Through its subsidiary, Amoco Chemicals Corp., Standard will build a 60-million-pound plant for the production of phthalic anhydride, isophthalic acid, terephthalic acid, dimethyl terephthalate, dimethyl isophthalate, and benzoic acid. Scientific Design will design the Standard plant, according to an announcement by Harry A. Rehnberg, SD president.

The new process discovery permits the upgrading of very large supplies of suitable feed stocks. Cheap intermediates (some of them laboratory curiosities up to now) for fibers, films, plastics, dyestuffs, resins, plasticizers, elastomers, and foams can be made from plentiful petroleum sources by the new techniques.

Dr. Ralph Landau, executive vice president of Scientific Design, disclosed that he had first thought of his group's entering the field of aromatic oxidation while he was searching for a way to make terephthalic acid for a prospective client from more plentiful and cheap raw materials than the para-xylene then used. He hit upon para-diisopropylbenzene, made from propylene and benzene, and together with his colleagues found a way to make this hitherto unavailable intermediate cheaply and in pure form. He then laid out a program of air-oxidation research because he believed that the nitric acid then employed as an oxidant for p-xylene and other aromatic hydrocarbons was fundamentally too expensive. This led the research group to discover that para-diisopropylbenzene could be directly oxidized with air in one step to terephthalic acid (which is used in making polyesters such as Dacron fiber and Mylar film).

Techniques were discovered for oxidizing various aromatics, including the xylenes, simply and directly with air to their respective dibasic acids. The same basic plant and equipment are used to convert most of these raw materials and produce a variety of products—thus giving the manufacturer great flexibility to meet market requirements.

Scientific Design is to be licensing agent for the processes outside the United States. In France, Pechiney has acquired certain rights, and another unnamed licensee has been acquired in another country.

Scientific Design was organized 10 years ago, and has set up laboratories at Manorhaven, L.I., N.Y., for process development. In the last decade it has undertaken 37 major chemical projects in various fields, many of which have been in the oxidation field.

Erratum

In an article by Theodore Wild in the November issue of World Petroleum on page 71 there was an omission in the last sentence of the third paragraph. The complete sentence should read as follows:

"Tertiary oil accumulation in this area is primarily either a structural accumulation which involves folding like Baku and Grozny or a stratigraphic trap, which involves angular overlap of tertiary over older rocks like Maykop field."

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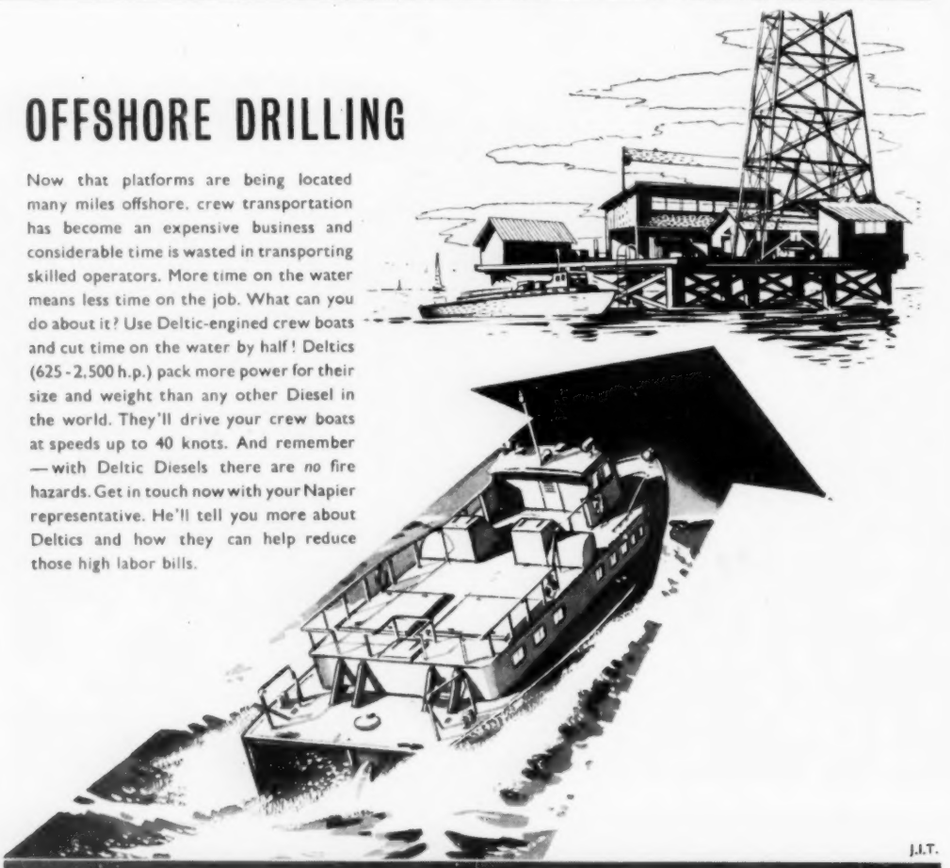

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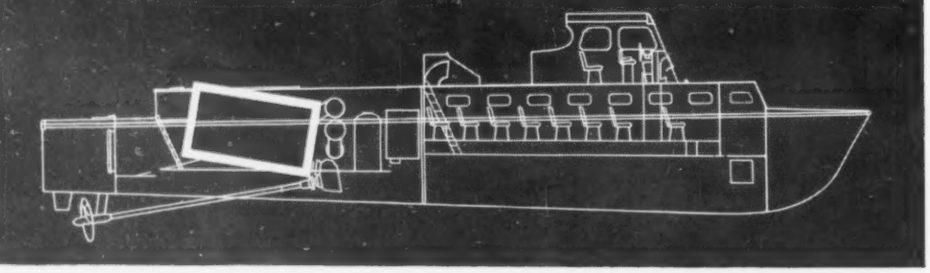

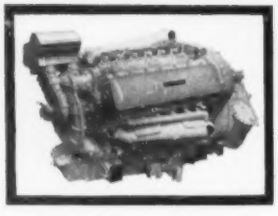

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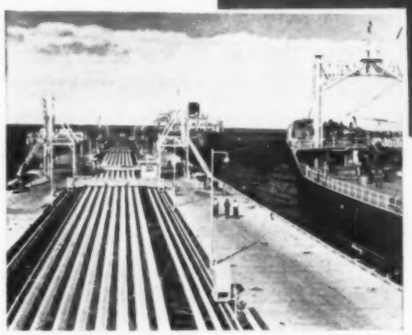

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Oil Company Staff Changes

DR. J. BENNETT HILL, pioneer oil-industry chemist, retired as director of Sun Oil Co.'s research and development department last November. He joined the company in 1934, and helped manage Sun's research program for the past 22 years. Previously he had directed oil research for Atlantic Refining Co. for 11 years. In 1950 the American Petroleum Institute awarded him a "certificate of appreciation" for his contributions to the API research program. Frequently called upon for varied government service, he is a well-known author of many papers on coal-tar and petroleum technology.

Dr. Hill is succeeded by Dr. Charles L. Thomas as director of Sun's research and development department. Dr. Thomas formerly was associate director.

Robert L. Kidd

ROBERT L. KIDD, of Bartlesville, Okla., has been elected a director of Cities Service Co. Mr. Kidd is president of Cities Service Oil Co. (Del.), principal oil and natural-gas producing subsidiary.

HARRY D. HANCOCK, a pioneer and for many years a leader of the natural-gas industry, has been elected president of Cities Service Gas Co., at Oklahoma City. He succeeds Glenn W. Clark, who resigned recently to become president of Mississippi River Fuel Corp. Kirby E. Crenshaw has been elected to the new post of executive vice president of the company. Mr. Hancock began with Cities Service companies in 1938, and Mr. Crenshaw in 1930.

ROBERT M. KAHL, purchasing agent for Cuban-Kewanee Oil Co., Tulsa, was promoted to vice president effective, January 1, and transferred to the Philadelphia offices.

Harry D. Hancock

ODELL CAMPBELL ras joined Kerr-McGee Oil Industries Inc., at Oklahoma City, as technical assistant to R. M. Chesney, vice president in charge of refining. Mr. Campbell formerly was manager of laboratories for E. I. du Pont de Nemours & Co., in Tulsa.

CHARLES H. DEARBORN has joined the executive office of International Petroleum Co. Ltd., in Coral Gables, Fla., as management development advisor. He transferred from the New York office of Esso Standard Oil Co., where he had been assistant coordinator of management and development.

JOHN I. MINGAY has been appointed assistant general manager of The Texas Co.'s marine department, in New York. Previously manager of the department's operations division, he is succeeded in that post by Marvin E. Lundfelt.

J. F. BLACKWELL, assistant manager (operations) of the producing division of The Texas Co.'s Foreign Operations Dept. (Western Hemisphere and West Africa) has been transferred from Caracas, Venezuela, to the New York office.

CHARLES L. HUGHES has been appointed personnel and industrial-relations department supervisor for Independent Exploration Co., Houston, Texas, for the formulation of training and personnel procedures.

D. E. LEGAN, production manager for the southern division of Tidewater Oil Co., died in Chicago last November. Having begun his career in oil half a century ago, he joined Tidewater 40 years ago, and spent the following 4 decades in the company's offices and oil fields in 7 Mid Continent and Southwestern states.

THEODORE L. WALKER, of Jackson, Mich., has been named works manager for Security Engineering Division at Dallas, Texas. Security, one of the Dresser Industries, also has plant facilities at Whittier, Calif. Both plants are engaged in the manufacture of rock bits and other drilling tools for the petroleum industry.

EVERETT M. BARBER, inventor of the Texaco combustion process, and supervisor of special engine research at the Texaco Research Center, Beacon, N. Y., was presented with the Richards Memorial Award by the American Socy. of Mechanical Engineers, November 28.

A. A. BUZZI has been appointed a vice president of the American Petroleum Institute, to represent its new division of finance and accounting. Since 1954 Shell Oil Co.'s controller, Mr. Buzzi has been an active member and officer of various accounting organizations, including International Accountants Socy., Controllers Inst. of America, American Inst. of Management, and the Research Inst. of America.

ARTHUR V. DANNER, vice president and director of Mobil Overseas Oil Co. Inc., has been elected president to succeed Paul V. Keyser, Jr. Mr. Keyser, as a vice president and director of Socony Mobil, will continue as a member of the Mobil Overseas board.

P. W. JUDAH, manager of the lubricating department of Socony Mobil Oil Co. Inc. since 1952, has been appointed manager of a newly-established petroleum chemicals department, which will be responsible for the sale of the company's chemical products. He will initiate market research studies, recommend laboratory research programs, and make continuing evaluation of opportunities in manufacturing and marketing related to petroleum chemicals.

Theodore A. Burtis

THEODORE A. BURTIS has been elected president and chairman of the board of Houdry Process Corp., succeeding C. G. Kirkbride. He also has been named a director of the corporation's subsidiary, Catalytic Construction Co. Mr. Burtis joined Houdry in 1947 as chief of the economics section, Research and Development Division. Formerly he had been with Magnolia Petroleum Co. and Owens-Corning Fiberglas.

Chalmer G. Kirkbride

CHALMER G. KIRKBRIDE has been named executive director of Sun Oil Co.'s research, patent, and engineering departments in Philadelphia. Accepting the appointment, Mr. Kirkbride resigned as president and chairman of Houdry Process Corp. Previously Mr. Kirkbride had been associated with the research activities of Standard of Indiana and Pan American Refining Corp.; with Magnolia Petroleum Co.; with A & M College of Texas, as professor of chemical engineering; and in 1947 joined Houdry.

P. W. Judah

SHELL

The first commercial hydro-desulphurising unit applying the Shell Trickle Phase technique was commissioned at the Stanlow Refinery in April 1955. The performance of this unit has exceeded expectation.

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Shell Trickle Phase hydrodesulphurisation unit, Stanlow refinery. A Shell photograph.

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A. G. SCHEI, treasurer, has been named vice president-finance of Shell Oil Co., New York, succeeding J. H. White, retired. C. C. Combs, vice president and treasurer of Shell Pipe Line Corp., Houston, succeeds Mr. Schei as treasurer. A. F. Hagen, Shell's treasury manager of the Houston exploration and production area, succeeds Mr. Combs as vice president and treasurer of Shell Pipe Line Corp.

JOE D. WALK has been named manager of economics in the manufacturing department of American Oil Company.

R. E. WRIGHT has been appointed staff petroleum engineer for The Texas Co. He has been petroleum engineer in the general manager's office at Houston. His new headquarters will be in New York City.

ROBERT J. BELKNAP has become managing director of Standard-Vacuum Oil Co. (East Africa) Ltd. at Nairobi, Africa. He succeeds L. H. Tremaine who will retire. Mr. Belknap was recently general manager of Standard-Vacuum Sales Co. in Indonesia and began his oil industry career as Stanvac's district sales manager in Calcutta in 1938. He was appointed assistant general manager at Djakarta in 1951 and two years later assumed the general managership. John R. Kendall will replace Mr. Belknap as general manager of the Indonesian sales organization.

GEORGE H. FREYERMUTH has been elected chairman of the board of Esso Export, Ltd., and Standard Oil International, Ltd., with headquarters in London. Both companies are international marketing and supply affiliates of Standard Oil Co. (N.J.) and facilitate the solution of foreign exchange problems involved in selling oil products abroad. Their operations are primarily in the Eastern Hemisphere where Mr. Freyermuth also will serve as senior representative of Esso Export Corp.

DR. JAMES A. TONG and **H. R. MOORMAN** have been elected president and executive vice president, respectively of Socony Mobil Oil Co. de Venezuela following retirement of John C. Case, a director of the parent company and its vice president in charge of producing.

J. HOWARD WHITE, financial vice president, Shell Oil Co., has been reelected treasurer of Controllership Foundation, Inc., research arm of the Controllers Institute of America.

DR. DAYTON H. CLEWELL has been named manager of Socony Mobil Oil Co. laboratories. Prior to his new appointment, Dr. Clewell was manager of Magnolia Petroleum Co.'s field research laboratories at Dallas, Texas.

H. THORNTON TARVIN has been made vice-president in charge of operations for Delta Marine Drilling Co., Taylor, Texas. He also will assist in the management and operation of Delta Gulf Drilling Co. another subsidiary of the Delta Drilling Co. He will make his headquarters in the newly opened office of Delta Marine in the California Co. building in New Orleans.

RICHARD C. MARMADUKE has been appointed chief geologist for the British American Oil Producing Co. He transfers from Oklahoma City where he has been Central division geologist to Dallas. Mr. Marmaduke joined British American February 1, 1952 as a staff geologist. He will be succeeded by Harold J. Reedy as division geologist at Oklahoma City.

P. C. SPENCER, president of Sinclair Oil Corp., has been elected a director of Texas Pacific Coal & Oil Co., Ft. Worth, to fill a vacancy on the board which has existed for some time. Sinclair recently acquired an approximate 30 percent stock interest in Texas Pacific, a domestic producer of crude oil and gas. Its present production amounts to about 21,000 net barrels daily.

First crude to the new refinery flows from the 27,300 ton S.S. Flying A Delaware. Gov. J. Caleb Boggs, center, turns a valve which sends the first crude oil cargo into the Delaware Flying A refinery storage tanks. Looking on are, left to right, George C. Caine, manager of manufacturing, Tidewater eastern division; George F. Getty II, Tidewater director, vice-president and general manager of the eastern division; Captain John D. Baldwin, master of the S.S. Flying A Delaware; and Richmond K. Kelly, Tidewater eastern marine manager.

GEORGE R. THOMAS, general superintendent of the Standard Oil Co. (Ohio) No. 1 refinery in Cleveland, has been named general superintendent of the company's Toledo refinery. Kenneth A. McDaniel, general superintendent of the Toledo refinery, replaces Mr. Thompson as general superintendent of the Cleveland No. 1 refinery. George C. Knepp, chief process engineer at the Lima refinery of The Standard Oil Co. (Ohio), has been promoted to the newly-created position of project coordinator at the Toledo refinery.

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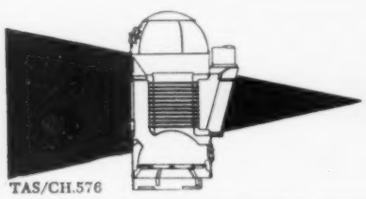

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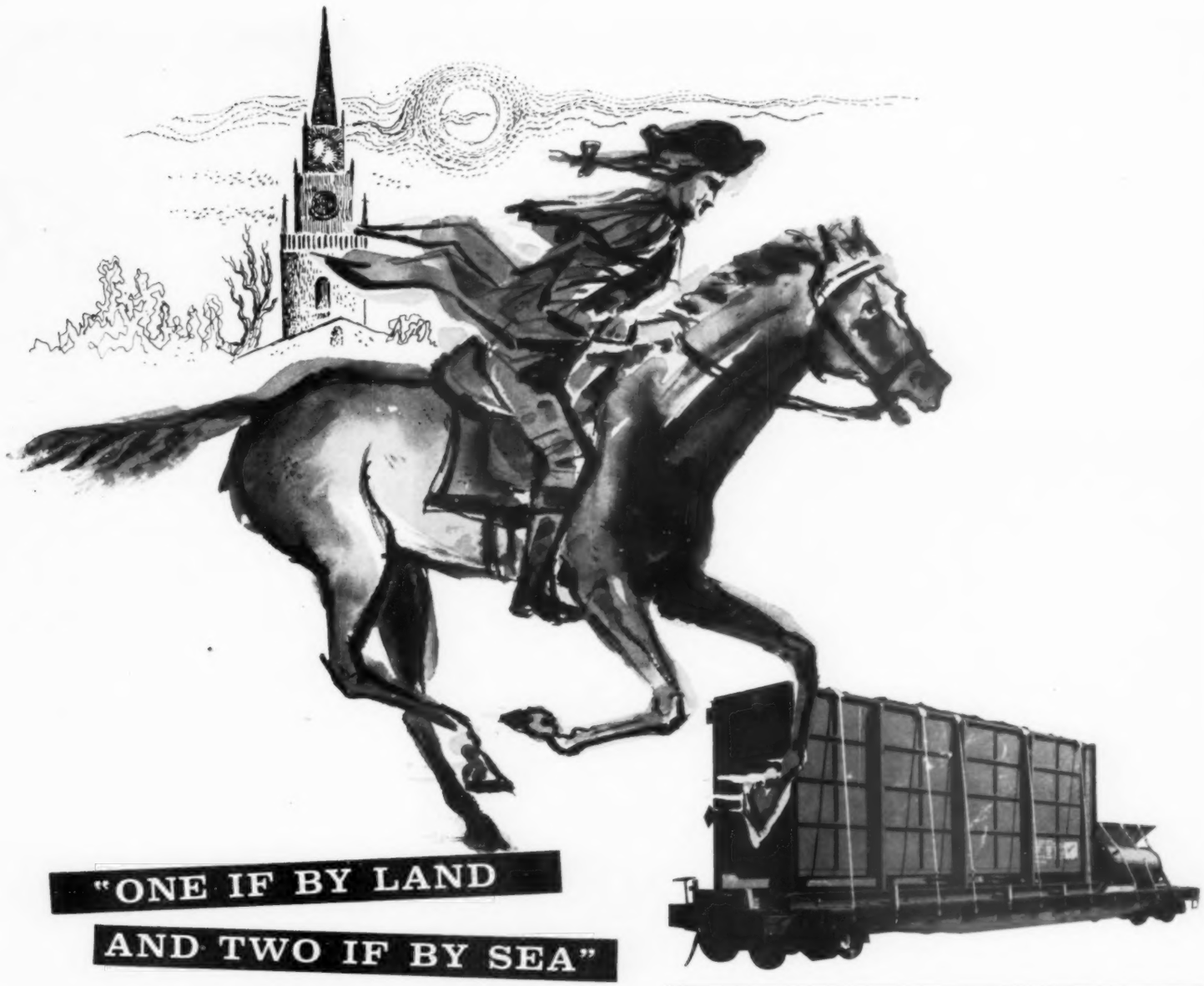

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CHARLES VAN BERG, chemical engineer, has been appointed economics advisor to the executive representative of International Petroleum Co. Ltd., at Bogota, Colombia. Until his transfer to International, Dr. Van Berg was with Humble Oil and Refining Co., where his assignments included many in the fields of economics and engineering.

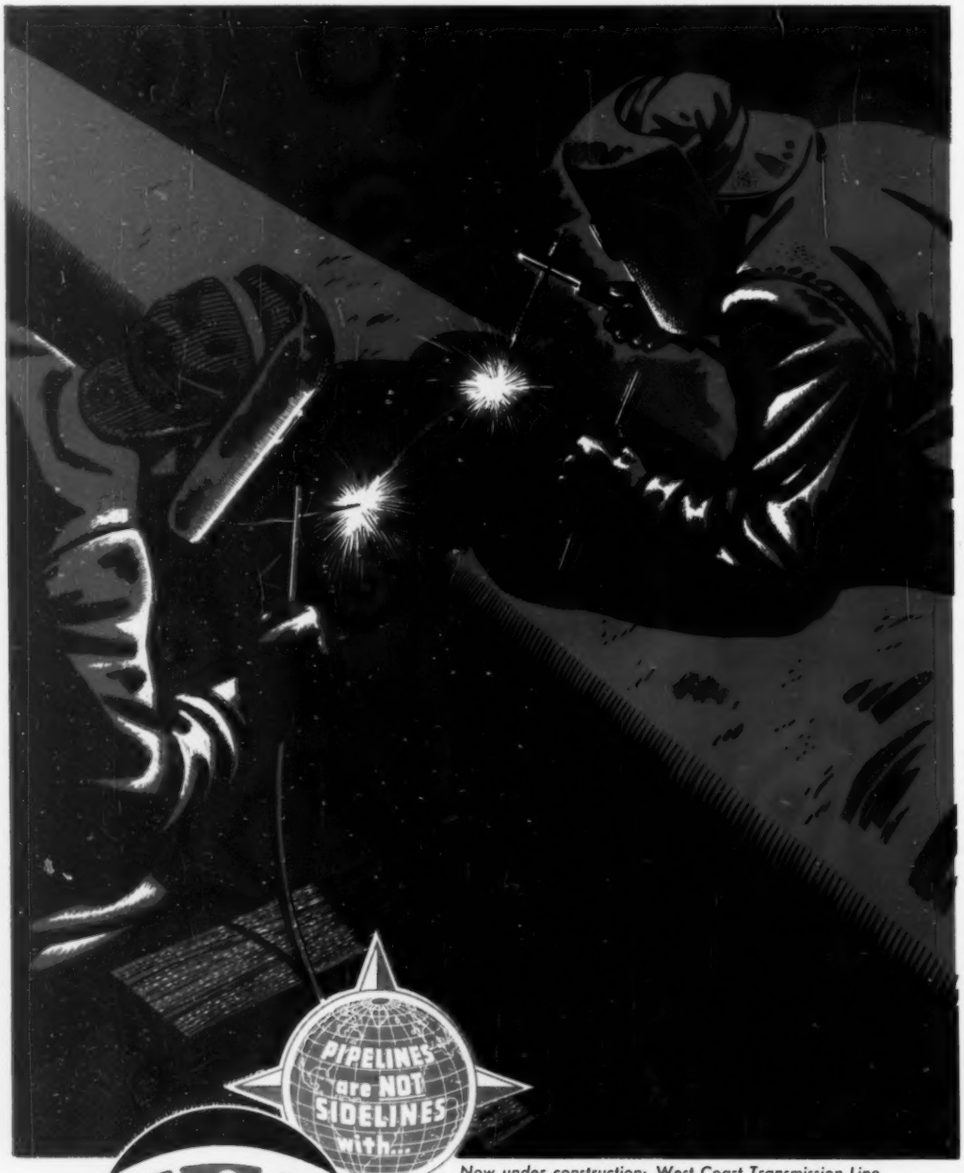
H. E. HUGHES has been named as the new manager of Shell Chemical Co.'s Denver plant, succeeding J. G. Bejarano, deceased. Formerly superintendent of the Houston plant, he is succeeded by J. W. Hyde, previously assistant superintendent.

REGINALD H. EAGLES, vice president, Industrial Products Dept., J. M. Huber Corp., New York, died at age 61. He began with the company as a carbon-black salesman in 1923. In a reorganization in 1947, Huber's sales of carbon black, clay, and chemicals were merged to form the Industrial Products Dept. The company is also a major producer of printing inks, oil and gas, natural gasoline, and oil-field production equipment.

SAM LAUD has been elected chairman of the board, and Lester N. Selig chairman of the executive committee, of General American Transportation Corp., Chicago.

A. J. WOOD, formerly chief technologist at Shell Oil Co.'s Wood River refinery, has been named superintendent of operations at Houston. He is succeeded at Wood River by J. W. Sheehan from head offices at New York.

MELVIN J. HILL has been appointed director of the geology and geochemistry division of Gulf Research & Development Corp., Gulf's research subsidiary at Pittsburgh. Formerly division geologist for Western Gulf Oil in Los Angeles, Mr. Hill will direct the development of new knowledge and new techniques in geology to aid the exploration geologist in studying rocks from the standpoint of the generation, migration, and accumulation of oil in commercial traps.



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Rawleigh Warner, Jr.

Albert J. McIntosh

RAWLEIGH WARNER JR. has been appointed manager of the economics department of Socony Mobil Oil Co. Inc., and a member of the company's coordination committee. He succeeds Albert J. McIntosh, who joins the public-relations department as a consultant. Mr. McIntosh was first employed by the company as an office boy 44 years ago at the age of 15.

Mr. Warner entered the oil industry in 1948. He came to the Socony Mobil organization in 1953 as assistant to the vice president and director of finance of Socony-Vacuum Overseas Supply Co. Inc., and in 1954 was appointed treasurer. When Mobil Overseas Oil Co. Inc. was organized, January 1, 1956, he was made its assistant treasurer. He was transferred to the economics department of the parent company in April 1956.

Mr. Warner entered the US Army Reserve as a corporal in 1943, and left in March 1946, as a captain with the 10th Mountain Infantry Division in Italy. He was awarded the Purple Heart, Bronze Star, and Silver Star medals.

Mr. McIntosh started with the company in 1912. Attending night school under the company's educational refund plan, he received his degree (with honors) from New York University in 1923. He has been in economics and statistical activities during most of his career with Socony Mobil. During both world wars he served with government agencies and committees.

C. M. GILE, vice president for domestic marketing of Gulf Oil Corp., Pittsburgh, as well as vice president and a director of the subsidiary, Gulf Refining Co., has retired after 30 years of service. Most recently he has been based in Denver, Colo., on special Gulf assignments.

S. K. McCAULEY has been appointed manager of the Iran Atlantic Co., as well as general manager of the manufacturing department of The Atlantic Refining Co. In his new position, he will be directly responsible for Iran Atlantic operations, and will assist in the activities of the crude-oil purchases and sales department.

Stanley G. Lehman

James V. Pickering

JAMES V. PICKERING and **STANLEY G. LEHMAN**—each with more than a quarter-century experience in the international oil industry—have been elected directors of Standard-Vacuum Oil Co., White Plains, N. Y. The new appointments increase the board to ten.

Mr. Lehman has been Stanvac's general representative in Australia for the past two years, serving also as an officer and director of five affiliated companies which operate in that country or in New Zealand. Mr. Pickering, general representative at London since 1954, as well as chairman and managing director of the tanker operating company there, in 1949 became general manager of the China division at Shanghai; in 1951 he was appointed managing director of Stanvac's marketing subsidiary in Indonesia.

KELLOGG ANNOUNCES NEW ISOMERIZATION PROCESS

A new process for isomerizing light naphthas has been announced by The M. W. Kellogg Co. The process, called Iso-Kel, is designed to help refiners increase their high octane pool by upgrading combined streams of pentane and hexane fractions as well as natural gasolines.

Kellogg's Iso-Kel process produces two separate products: (1) an isopentane stream of 104.9 CFRR + 3 cc TEL, and (2) an isohexane stream of 89 to 92 CFRR + 3 cc TEL, depending on the feedstock. The isopentane stream can be allocated for the super premium gasoline; the isohexane stream for the housebrand. When charging light naphtha, the combined streams have an overall yield of 97 vol.% and an octane number of about 96 CFRR + 3 cc TEL. When feeding natural gasoline, overall yield is 99 vol.% and octane number about 99.8 CFRR + 3 cc TEL.

The Iso-Kel process employs a new, precious metal catalyst (not platinum) developed in Kellogg's research laboratories. It operates in the vapor-phase and requires only one reactor—which operates in the presence of hydrogen. There are no corrosive elements in the system and operating conditions are less severe than those for reforming heavy naphtha. Kellogg has calculated that a 3,100 barrel Iso-Kel unit in a 50,000 b/d refinery would have a payout of about 19 months. Payout time can be further reduced when existing equipment can be utilized.

Depending upon quality of feedstock and degree of upgrading desired, the process flow sheet can be varied to allow for prefractionation of isomers in the feed, and recycle of unconverted material. Economic calculations indicate that, in general, it is preferable to process pentanes on a recycle basis, and to process hexanes once through.

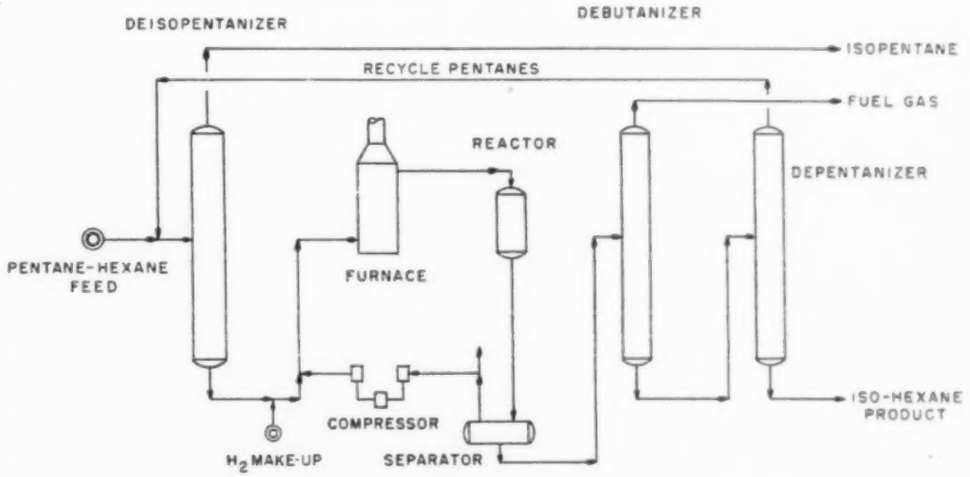
TABLE I

COMPARISON OF LEADED AND CLEAR NORMAL AND ISOMERS OF PENTANE AND HEXANE

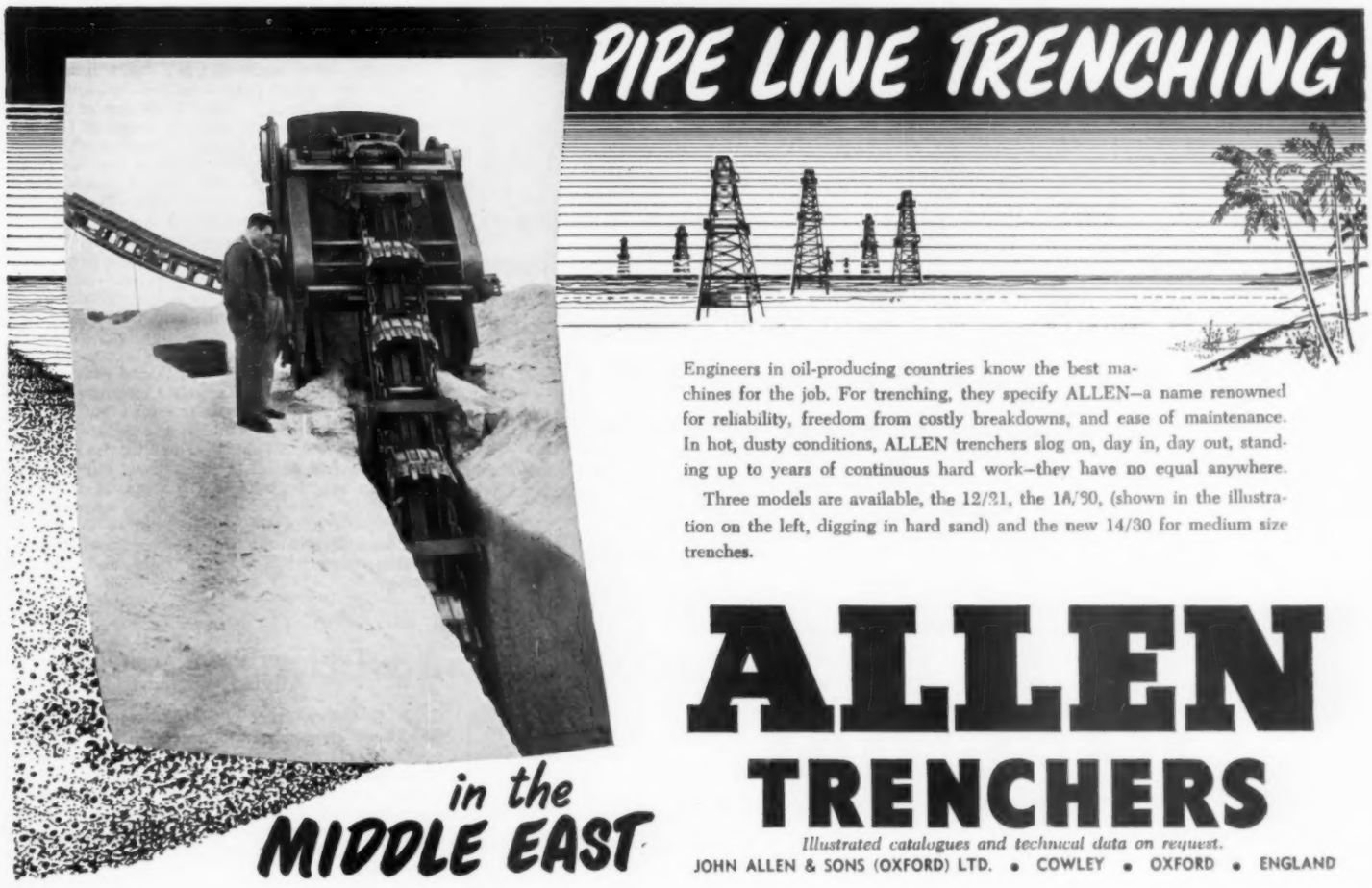
	*Research Octane Number**	
	Clear	*+ 3 cc TEL*
n-pentane	61.7	88.7
i-pentane	92.3	105.7
n-hexane	24.8	65.3
2 methylpentane	73.4	93.1
3 methylpentane	74.5	93.4
2,2 dimethylbutane	91.8	104.3
2,3 dimethylbutane	102.7	108.9

*Octane numbers above 100 by formula:

$$ON = 128 - \frac{2800}{PN}$$



Flow Diagram of Kellogg's New Iso-Kel Process



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Three models are available, the 12/21, the 14/30, (shown in the illustration on the left, digging in hard sand) and the new 14/30 for medium size trenches.

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TABLE II
ISOMERIZATION OF PENTANE-HEXANE FRACTION FROM COMMERCIAL STOCKS

	KUWAIT		*MID-CONTINENT*		*NAT. GASOLINE*	
	Feed	*Product*	*Feed*	*Product*	*Feed*	*Product*
TOTAL C_5-C_6						
Vol.%	100.0	97.3	100.0	96.7	100.0	99.2
Octane CFRR-Clear	63.7	77.7	62.1	77.0	72.3	83.3
+ 3 cc TEL	88.3	96.2	87.3	95.8	93.9	99.8
PENTANE FRACTION						
Vol.% of Total C_5-C_6	45.0	45.0	34.5	34.5	58.5	58.5
Octane CFRR-Clear	74.4	91.0	72.9	91.0	79.2	91.0
+ 3 cc TEL	95.8	104.9	94.9	104.9	98.4	104.9
HEXANE FRACTION						
Vol. & of Total C_5-C_6	55.0	52.3	65.5	62.2	41.5	40.7
Octane CFRR-Clear	54.9	66.3	56.4	69.2	62.2	72.2
+ 3 cc TEL	82.2	88.7	83.3	90.7	87.5	92.4

The mixed feed is charged to a deisopentanizer, where it is joined by pentane isomerization product. The isopentane present in both the fresh feed and reactor product is taken overhead, and the bottoms are sent to the reactor. Hydrogen-rich gas is charged to the reactor with the feed, and separated from the effluent for recycle. The process is nearly self-sufficient for hydrogen, and only a small quantity of hydrogen make-up is necessary. The reaction product from the separator is debutanized and depentanized.

The hexanes are isomerized once-through, with only a small incremental investment over pentane isomerization alone. Further upgrading, at greater cost, could be achieved by the addition of a deisohexanizer and an auxiliary depentanizer, to remove the isomeric hexanes in the feed or to give complete recycle of n-hexane.

Yields and quantities calculated for processing three light naphthas of varying crude source are shown in Table II. These calculations were based on experimental data obtained from processing pentanes and hexanes.

Electrical Water Desalter

The Bahrain Petroleum Co. Ltd. is installing an electric plant to produce 86,400 gal per day of fresh water to supply the drinking and cooking water needs of a community of about 5,000 persons centered in Awali near the Bapco refinery. Brackish well water is processed.

The desalting plant was manufactured by Ionics Inc., a Cambridge, Mass., firm which developed the desalting apparatus. Installation followed the successful operation of a smaller plant installed on Bahrain more than a year ago. A plant for use in the Neutral Zone, between Kuwait and Saudi Arabia, will go into operation next year.

The desalting plant is automatic in operation. The principal operating costs are electricity and occasional replacement of thin plastic membranes, of which 4,500 are used in the plant. Fifteen kilowatt-hours of electricity will make 1,000 gal of fresh water from the feed water. Membrane replacement costs are expected to be less than 50¢ per 1,000 gal.

The Ionics plant consists of 15 basic desalting units, each about the size of an automatic washing machine. The 15 units are connected in 3 parallel banks of 5 series units.

In the series, each of the 5 units removes up to 40% of the salt present at the beginning of the cycle, so that input water of 3,100 ppm of dissolved solids is converted to produce water of less than 450 ppm of dissolved solids. Because the Ionics process does not remove air from the water and leaves in some solids, the product water has an excellent fresh taste, rather than the flat taste often associated with distilled water.

The plant takes advantage of the fact that the molecules of salts and minerals when dissolved in water break into two parts, or ions—one with a positive and one with a negative electric charge. A direct electrical current forces the negative ions in one direction and the positive ions in the opposite direction.

Permanent separation of salt and water is attained by a series of water-tight membranes which pass either positive or negative ions, but not both. By arranging the membranes alternately, every other compartment in the desalter becomes increasingly free of salt, while a heavy buildup takes place in neighboring compartments. In this plant the fresh water comes from the even-numbered compartments, while a heavy brine is pumped continuously from the odd-numbered compartments —thus carrying away the salts and minerals removed.

Tidewater Sends Technical Advisor to Iran

J. E. Bailey, chief petroleum engineer for the southern division of Tidewater Oil Co., has been sent by his company to Iran to serve two years (on loan) as senior technical advisor to the National Iranian Oil Co. Tidewater is a member of a consortium having an interest in the Iranian Co., and each member of the group has agreed to send technical personnel to participate in the operations.

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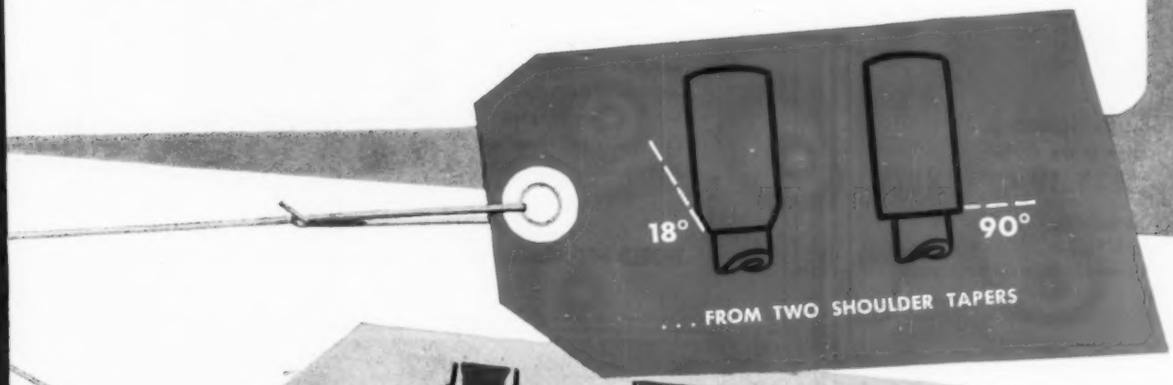

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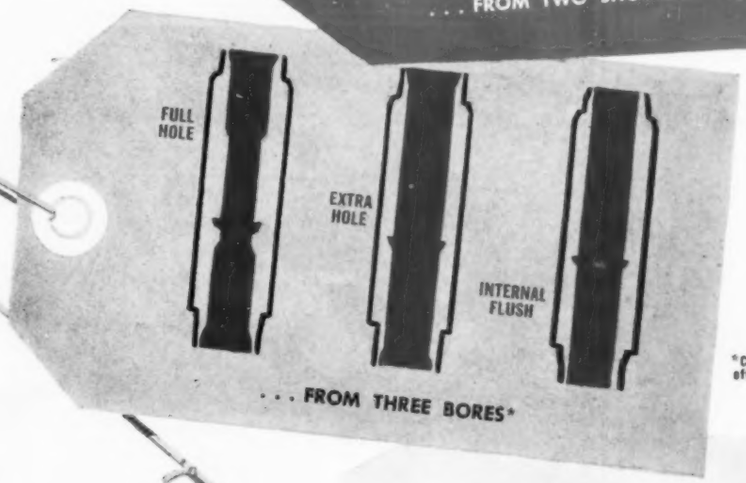

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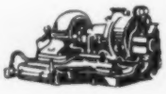

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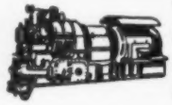

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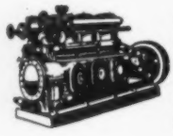

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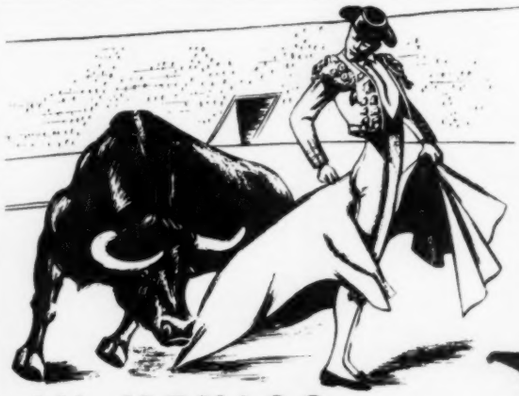

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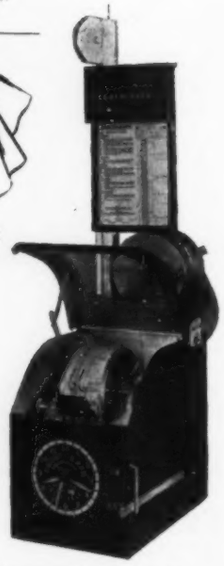

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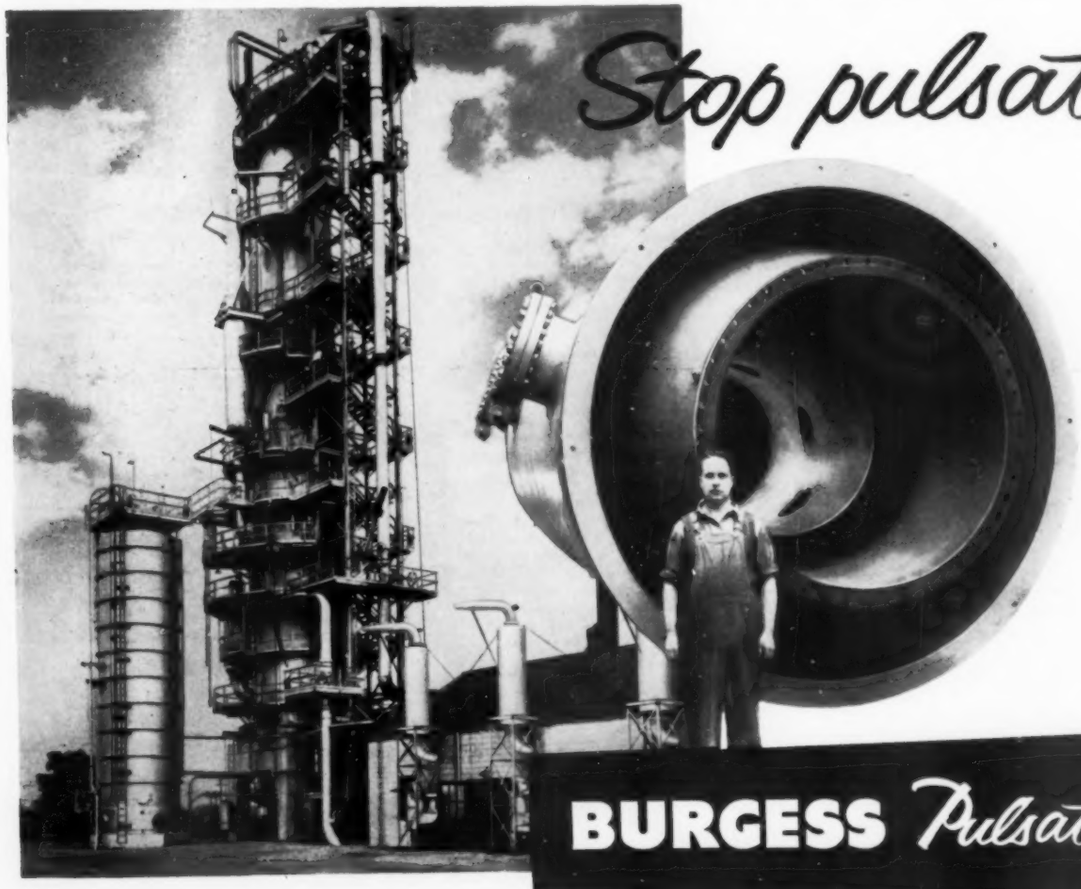

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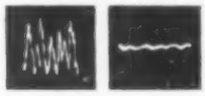
Pipes carrying gas and air under pressure from pumps, blowers, or compressors may fail, or require special reinforcement, as a result of surging and the consequent pulsatory vibration. This problem is overcome by fitting BURGESS Snubbers, which convert intermittent flow to smooth flow—and which, by eliminating a cause of line failure, often effect economies by permitting less costly pipes to be used. BURGESS Snubbers are made to the specifications and design of the original American BURGESS-MANNING patents.



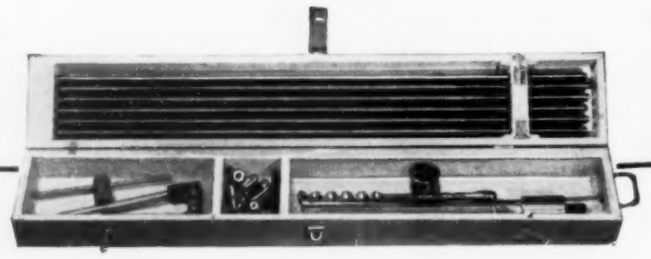
Oscilloscope recording shows pulsation (left) and smooth flow attained after fitting BURGESS Snubber (right).

BURGESS *Pulsation Snubbers*

Designed by BURGESS-MANNING, DALLAS, TEXAS · Manufactured by BURGESS PRODUCTS CO. LTD., ACOUSTICAL DIVISION, HINCKLEY, ENGLAND

THE MACKINTOSH PROSPECTING TOOL

THE LIGHTEST, CHEAPEST AND HANDIEST RIG YET DEVISED FOR PUTTING HOLES IN ALLUVIAL SOIL



Specifications—Net weight of tools 54 lbs.; Weight of case with tools 84 lbs.; Shipping weight 107 lbs.; Size of case 4 ft. 5 ins. x 11 ins. x 8 ins.

The Mackintosh boring and prospecting tool is neatly packed, easily operated and transported by one man. Simple, reliable and efficient, with nothing to go wrong, it is suitable for many purposes and is supplied in hundreds to Oil Companies, Foreign Governments and Colonial Authorities.

SIMPLE AND QUICK OPERATION

A 1-inch dia. steel driving bit is connected to a set of 4-foot, ½-inch dia. steel rods. By means of a tripod and driving arm arrangement, the bit is easily hand-driven into such formations as brick-dust, clay, sand, alluvium etc., up to the hardness of solid chalk.

At 50 feet, the area in frictional contact with earth is still only ⅛ of that of a plain rod or "bulling-iron" at 4 feet. 20 or more holes 30 feet deep can be made by one man in one day. No debris or earth-spoils are left. Simple attachments enable core or water samples to be taken quickly and accurately.

Write for publication 30ABS.

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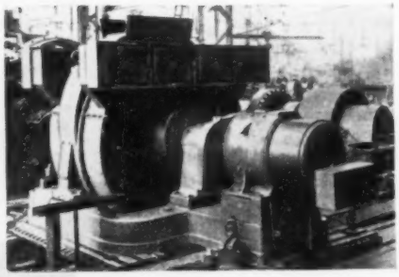
PLAY A VITAL PART IN KEEPING THE OIL FLOWING

In the blinding desert dust storms which sweep the area of the Iraq pipelines, VOKES filters have twice been chosen for the important task of protecting pumping stations and ancillary equipment . . . proof indeed of the important part which VOKES filtration is playing throughout the world in safeguarding plant and machinery from wear, breakdown and unnecessary depreciation.
Below are shown three typical aspects of VOKES protection . . . protection which cannot be jeopardized by the non-availability of element replacements because VOKES FILTERS ARE CLEANABLE.

MICRO-VEE PANEL FILTERS FOR ELECTRIC MOTORS

Electric motors breathe too . . . and these VOKES filters have proved conspicuously successful in preventing the grave damage hitherto sustained during operations in impure air conditions.

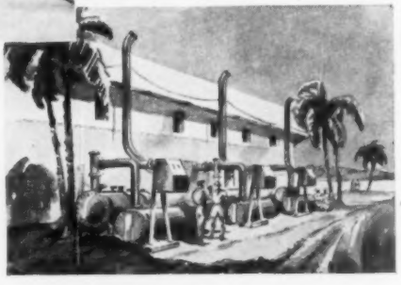


VOKES FILTERS FOR ANCILLARY EQUIPMENT

Compressors . . . portable generators . . . welding sets . . . power packs . . . all need protection against the ingress of abrasive dust, whether by air-intake, lubricating oil or fuel.

VOKES FILTERS FOR STATIONARY DIESEL ENGINE

Under abnormal conditions like these, engines have to be doubly protected and these large diesel engines are therefore fitted with Microvee dry fabric filters for cleaning the intake air. Vokes Filters are also specified for atmospheric air filtration in the ventilating systems of many of the desert buildings.



VOKES LIMITED

VOKES LTD. Head Office: GUILDFORD, SURREY, ENGLAND

Telephone: Guildford 62861 (6 lines). Telegrams and Cables: Vokesacess, Guildford, Telex. Telex: 13-535 Vokesacess.

London Office: 123, Victoria St., Westminster, S.W.1

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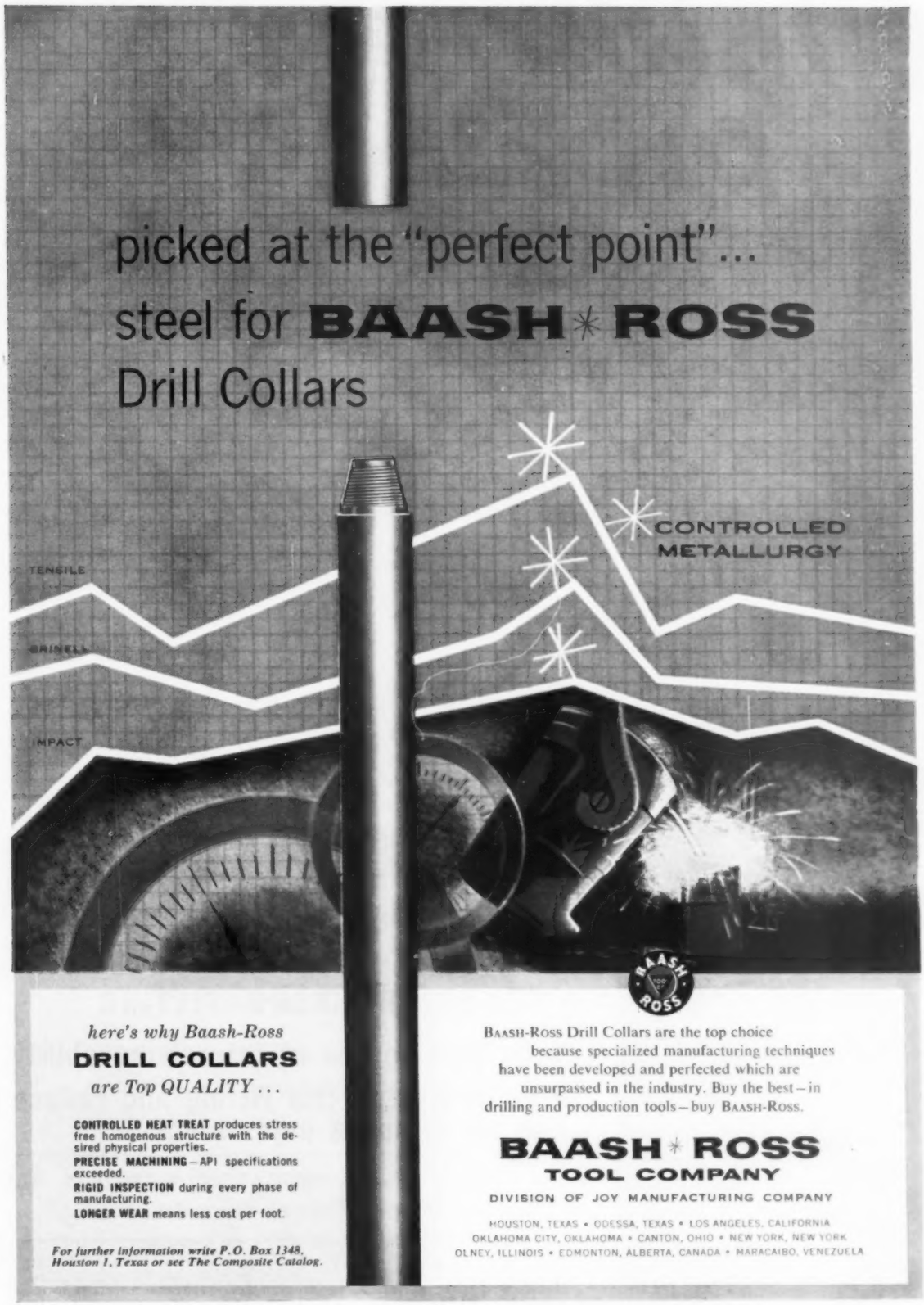

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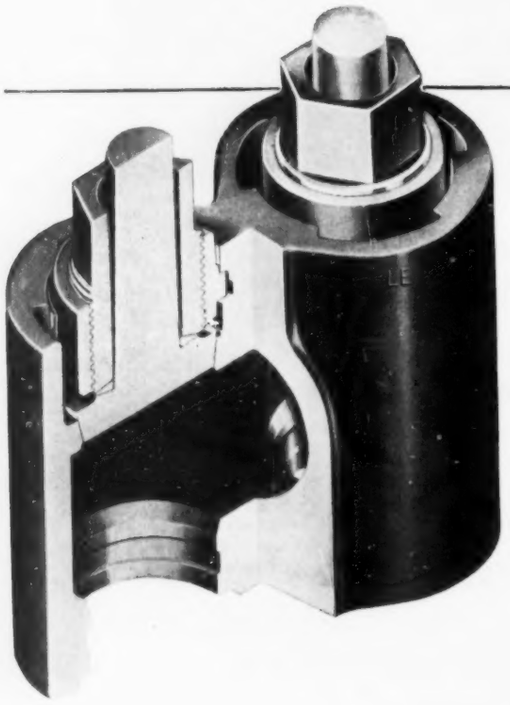

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Sir Edmund Hillary, leader of the New Zealand Party, is here seen driving a tractor, while his second in command, Mr. Bob Miller, supervises the unloading of aircraft fuel at the stores dump near Shackleton Base.

The British Petroleum Company is proud of its association with the Expedition—a tribute to the high quality of all products marketed under the BP Shield throughout the world.

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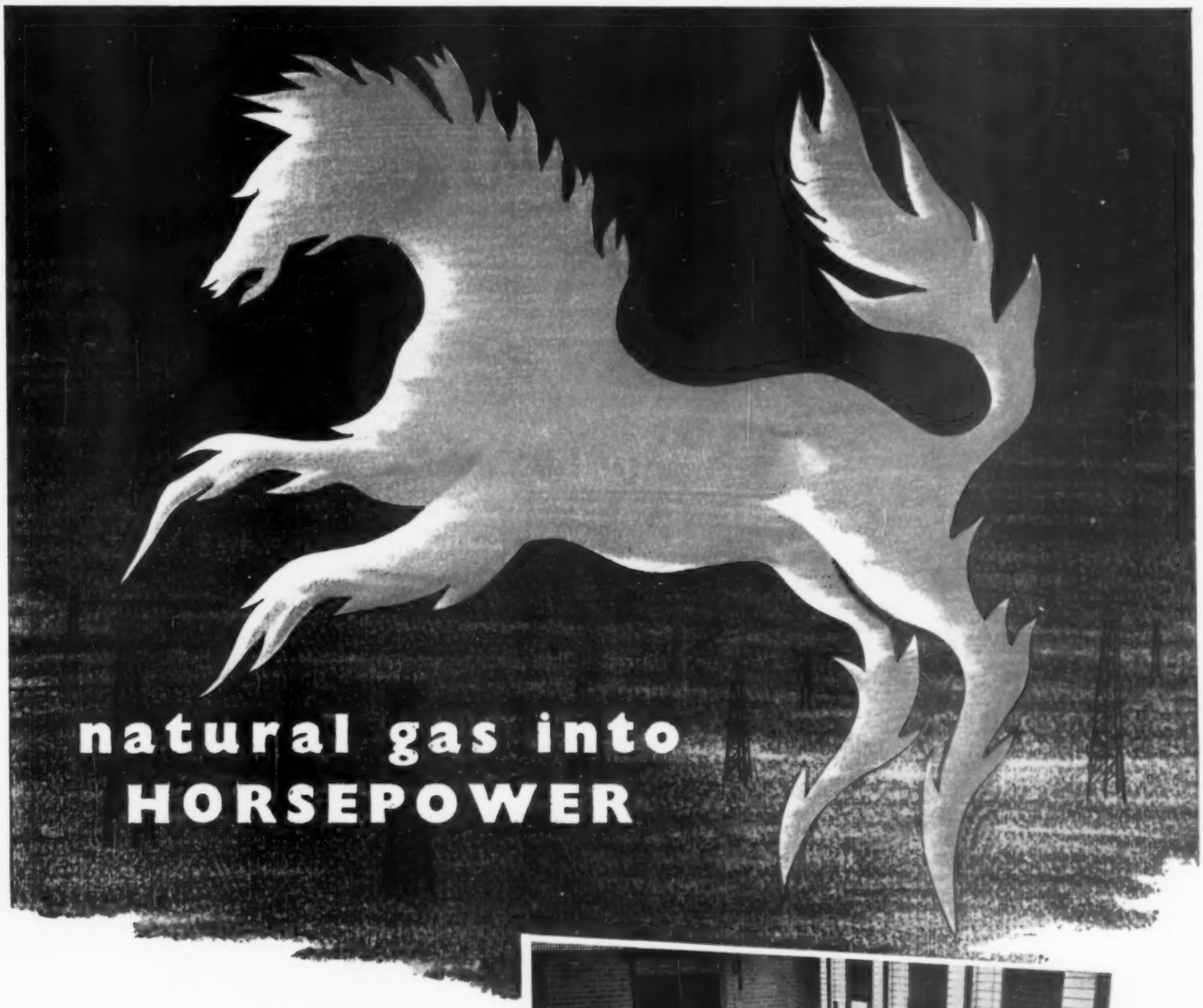

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These Ruston Gas Turbines have been installed to run on natural gas and to supply power for the entire works of C A Cemento Carabobo Sucra, Valencia, Venezuela.

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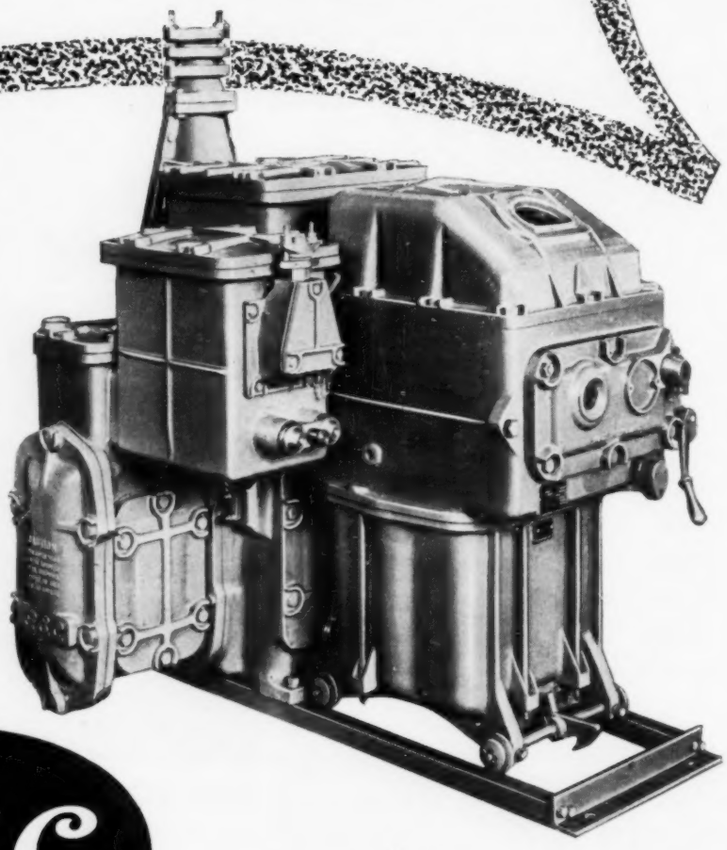

- Complies fully with the recommendations in the Report of the Royal Commission on "Safety in Coal Mines".
- Covered by Buxton Certificates, Groups 1 and 2.
- Approved breaking capacity of 25 MVA at 3.3 kV in accordance with British Standard No. 116.
- Detachable cable box simplifies cable jointing.
- Available in single and multiple units.
- Lighting transformers, up to 5 kVA, can be mounted on the unit.

G.E.C.

Full particulars are given in Technical Description No. 380.

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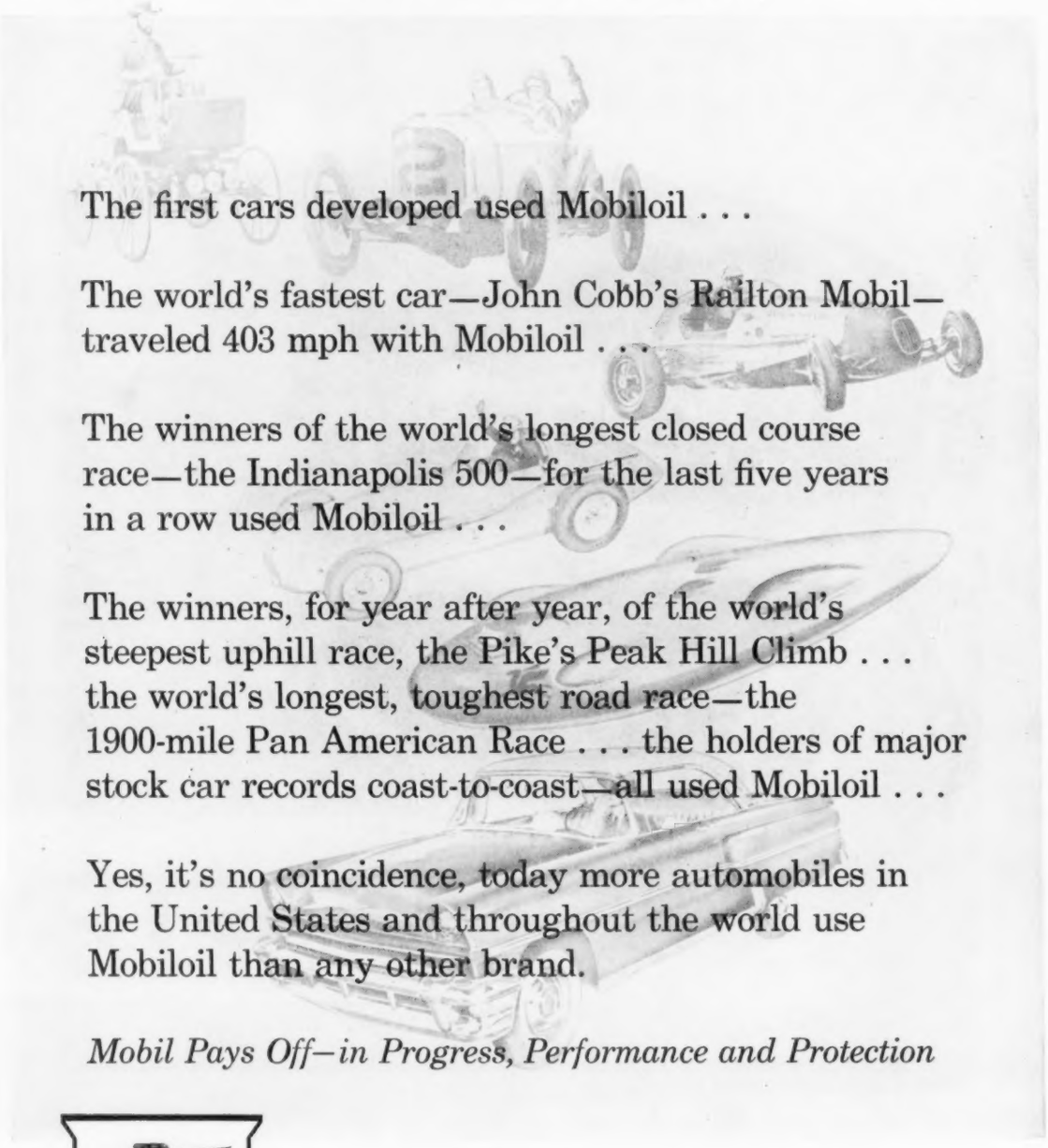

The first cars developed used Mobiloil . . .

The world's fastest car—John Cobb's Railton Mobil—traveled 403 mph with Mobiloil . . .

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Yes, it's no coincidence, today more automobiles in the United States and throughout the world use Mobiloil than any other brand.

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FOR WELDING, CUTTING, HEATING, FLAME CLEANING

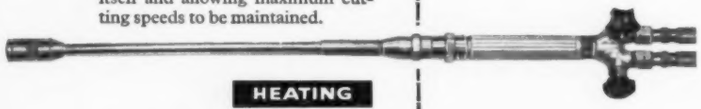
Here for the first time is an outfit that can be used for all these operations. The basis is a common shank to which the various heads for welding, cutting, heating and flame cleaning can be fitted, easily and quickly. With one shank you can build up the set with some or all the heads to meet your needs as they occur. Alternatively you can buy the complete outfit with the entire range of heads in a portable case.

WELDING

A complete range of swaged or detachable tips are available covering all welding requirements up to 1".

CUTTING

The cutting attachment will cut steel up to 2" thick. The highest degree of safety is ensured by the use of *nozzle-mixing*, limiting any possibility of backfire to the nozzle itself and allowing maximum cutting speeds to be maintained.



HEATING

The nozzles screw on to the straight welding neck or on to flexible necks which can be bent to any angle.

FLAME CLEANING

Flame cleaning attachments screw directly into the mixer and consist of a bent neck or a straight neck with a range of detachable flat or round nozzles.

For full details please write to:

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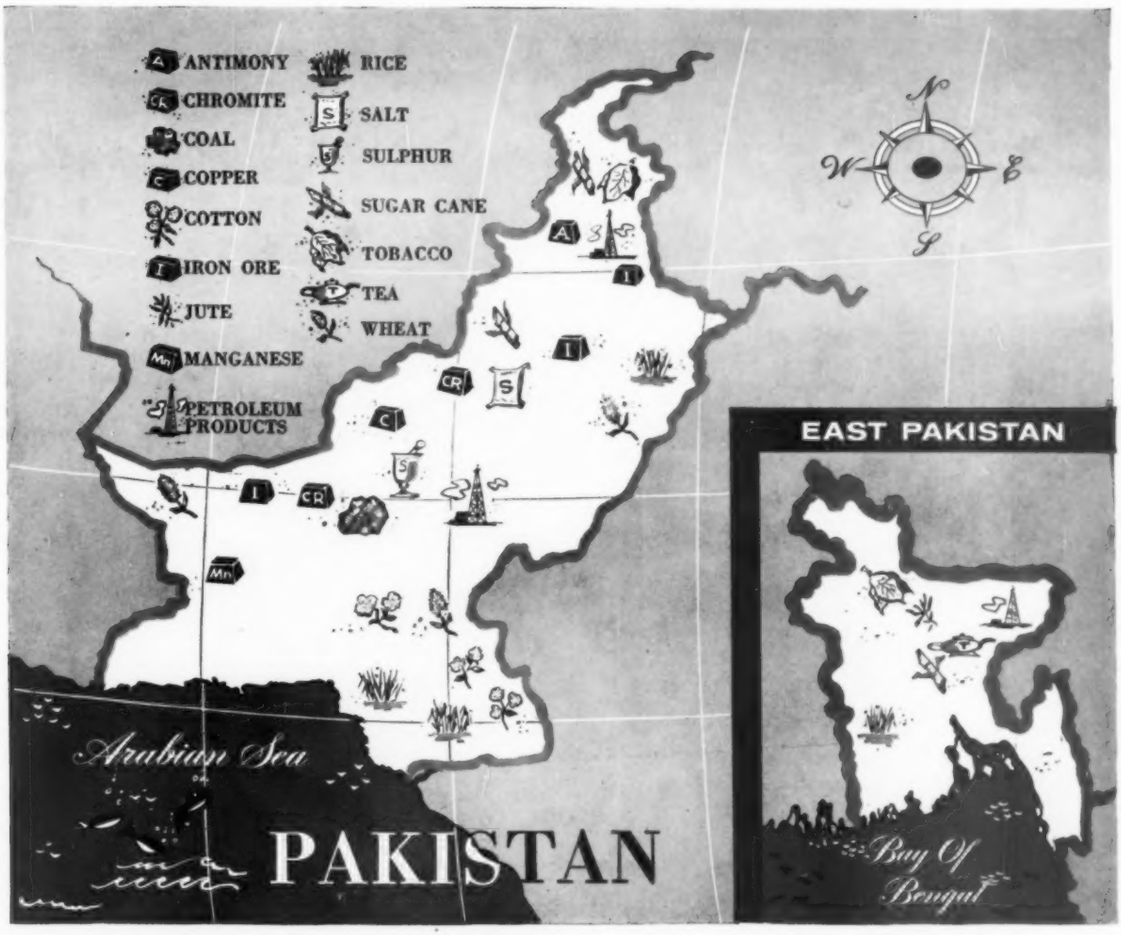

PAKISTAN, a vigorous new democratic nation with a population of 80 million and an area of 364,737 square miles, is roughly the size of Texas, Ohio, New York and Massachusetts combined. A land of wide rivers, jute fields, rice paddies and tropical jungles, Pakistan is divided into two "wings" separated by 1,200 miles. With the heritage of a civilization over 4,000 years old, this fertile land, essentially an agricultural country, was swept by invaders from the time of Alexander the Great. The first Muslim rulers established themselves in this area in the 10th century. British rule, dating from the early 19th century, was followed by complete independence on August 14, 1947. On March 23, 1956 the Islamic Republic of Pakistan came into being. Pakistan has taken tremendous strides toward industrialization. She is today the world's largest producer of jute—from which twines, ropes, and burlap are made. Cotton, paper, refined sugar, cement, matches, rubber tires, vegetable oils, and cigarettes are among the nation's manufactured products. Production of petroleum has shown more than a five-fold increase since 1947. Standard-Vacuum was the first oil company to sign an agreement with the Government which permits the exploration and production of petroleum on a modern cooperative partnership basis. The Company is now conducting extensive geophysical and geological surveys in both wings, and is drilling the first deep test well under the agreement.

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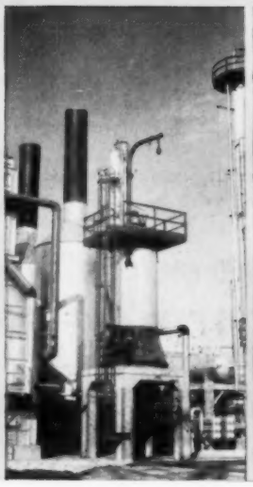
Overall view of the UOP Platforming-Unifining units at the Cheyenne (Wyo.) refinery of Frontier Refining Company.



Unifining unit reactor, with reactor charge heater in background.

Frontier engineer adjusts fuel gas control valve on Platformer charge heater.

Unifining Cat Cycle Oil Solves Major Sales Problem For Frontier

By M. H. Robineau
President
Frontier Refining Company
Denver, Colo.

A year of steady progress has been experienced by our company since the installation of two new refinery processing units—a UOP Platformer and a Unifining unit.

M. H. Robineau

Before these processes were added, Frontier had a serious sales problem due to the high sulfur content of our cat cycle oil which made it difficult to market profitably our entire daily production of 1,600 barrels of this distillate. We had two markets for this material—Diesel fuel for the Union Pacific Railroad and No. 2 domestic burner oil.

Since the cat cycle oil as such had a sulfur content of 1.25 weight per cent, it failed in its original state to meet the railroad's specifications. Hence we were forced to blend it in equal proportions with a straight run Diesel fuel—for which we had a ready truck market—in order to produce a fuel which met the UP's standards. This operation was economically undesirable because the straight run Diesel which could have been sold for 11 cents a gallon as truck fuel, had to be blended with cycle oil to make a product acceptable to the railroad and for which we received approximately 9 cents a gallon. Compounding the problem was the fact that after selling the maximum possible quantities to the railroad, truck lines and home heating markets, we had remaining several thousand barrels a month of cycle oil which were sold at sacrifice prices as industrial oils because of the high sulfur content.

Another facet of the problem was a short supply of straight run Diesel oil, and there appeared to be little chance that additional amounts could be obtained from the two crude topping units, whose combined daily capacity approximated 10,000 barrels.

Frontier sought the help of Universal Oil Products Company to improve its distillate stock position. UOP, after extensive engineering and pilot plant studies, recommended that we install a Unifining unit to operate alternately on a charge of either 3,000 B/SD of straight run distillate or 2,500 B/SD of a 50-50 blend of cat cycle oil with straight run distillate.

Frontier "bought the idea." However, a major obstacle had to be overcome—a practical source of hydrogen. It was decided to add Platforming not only because it would provide an economical source of hydrogen but because it would also substantially improve the overall octane rating of the refinery's gasoline and would effect considerable savings in the quantities of tetraethyl lead used for motor fuel blending purposes.

The contract for constructing the units was awarded to Procon Incorporated, and work was completed on schedule. With the aid of electronic instrumentation (Frontier is the first U. S. refinery to have liquid level indications completely transmitted by electrical impulses to the graphic panel), the units were lined out in relatively short time. Operation of the Unifining unit differed from the original schemes from the beginning. Instead of running on one of the alternate operating plans, cat cycle oil was charged to the unit and it ran on this feed for approximately two months.

Unifining this oil brought notable results. More than 90 per cent of the sulfur was removed, the bromine number was sharply reduced, compatibility was improved, and the cetane number and Diesel index were increased so that more cat cycle oil could be blended off into a higher priced product. The net result was the elimination of a product which formerly was sold at sacrifice prices in favor of one which required no special blending to make it 100 per cent salable.

With the Platformer, Frontier has increased by three numbers the octane ratings of its gasolines while substantially reducing its requirements for tetraethyl lead. The ease of octane improvement inherent to Platforming has made it possible to use natural gasoline, previously employed to upgrade octanes, more profitably elsewhere in the refinery.

The successful operation of the Platforming and Unifining units has given Frontier a new impetus which has been reflected in a more economical refinery operation and a greatly expanded marketing program, the latter by virtue of our ability to offer to the public a variety of products much higher in quality than had been possible previously.

Frontier combines UOP Platforming and Unifining processes for increased operational economy and expanded marketing program

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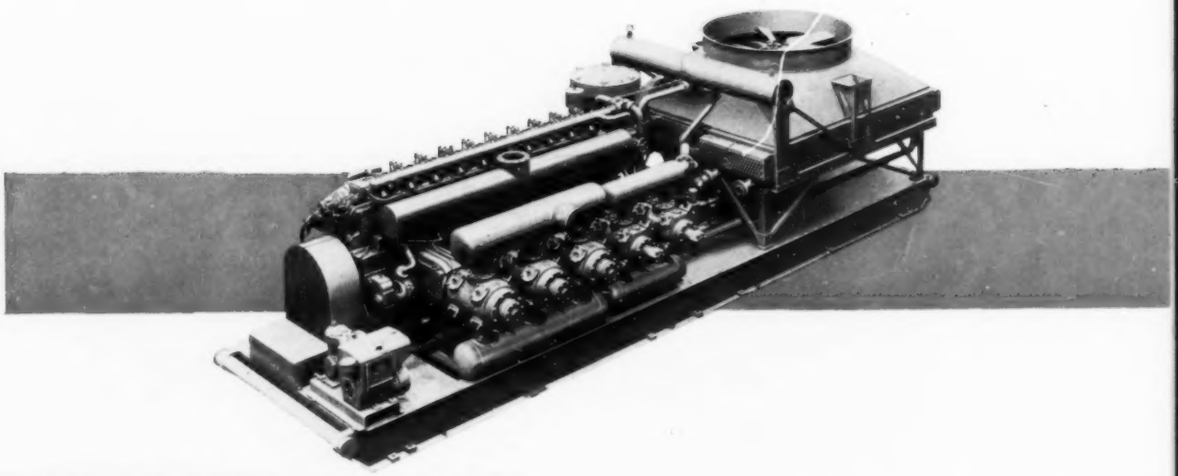

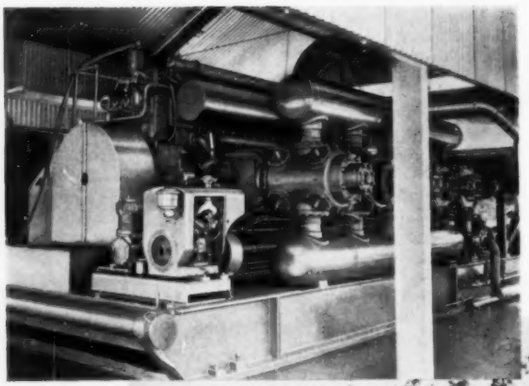

"Highly

A performance report from
The La Gloria Corporation
on the First **Clark**
HMAB-10 "Midget Angle" packaged
compressor station installation

satisfactory"

Now over 7000 hours on stream

After 7000 hours of hard 24 hour a day service the performance of the first HMAB-10 Midget Angle installed is reported as being "highly satisfactory." There has been a complete absence of mechanical failures with only routine maintenance required.

The HMAB-10, installed at Waskom, Texas, is a completely self-contained packaged compressor station developing 550 bhp. The La Gloria Corporation is using it to gather gas at 50 psig. and compress it in two stages to 980 psig. Subsequent to after-cooling, the gas is piped to a gasoline plant where it is stripped and sold to a pipeline company.

Similar in appearance to the smaller HMA, the new unit incorporates the basic design features of the HMA as well as many new innovations. Foremost of these is a new radiator and hydraulic radiator drive. Both the radiator and drive have completely measured up to expectations with flawless operation.

Substantial savings in erection time were realized at Waskom because the HMAB-10 was delivered as a factory tested, completely assembled unit. Balanced/Opposed design greatly reduced foundation needs.

One very important consideration for users of this 550 bhp. unit is the fact that it is equipped with five compressor cylinders as standard equipment. If field pressures drop excessively, conversion to three-stage operation is easily accomplished. There is also ample physical space in the radiator to add another cooling section for additional intercooling. Demand for this new unit is heavy but new production facilities will soon be ready to speed deliveries. Be sure to get all the facts on the HMAB from your nearest Clark representative.

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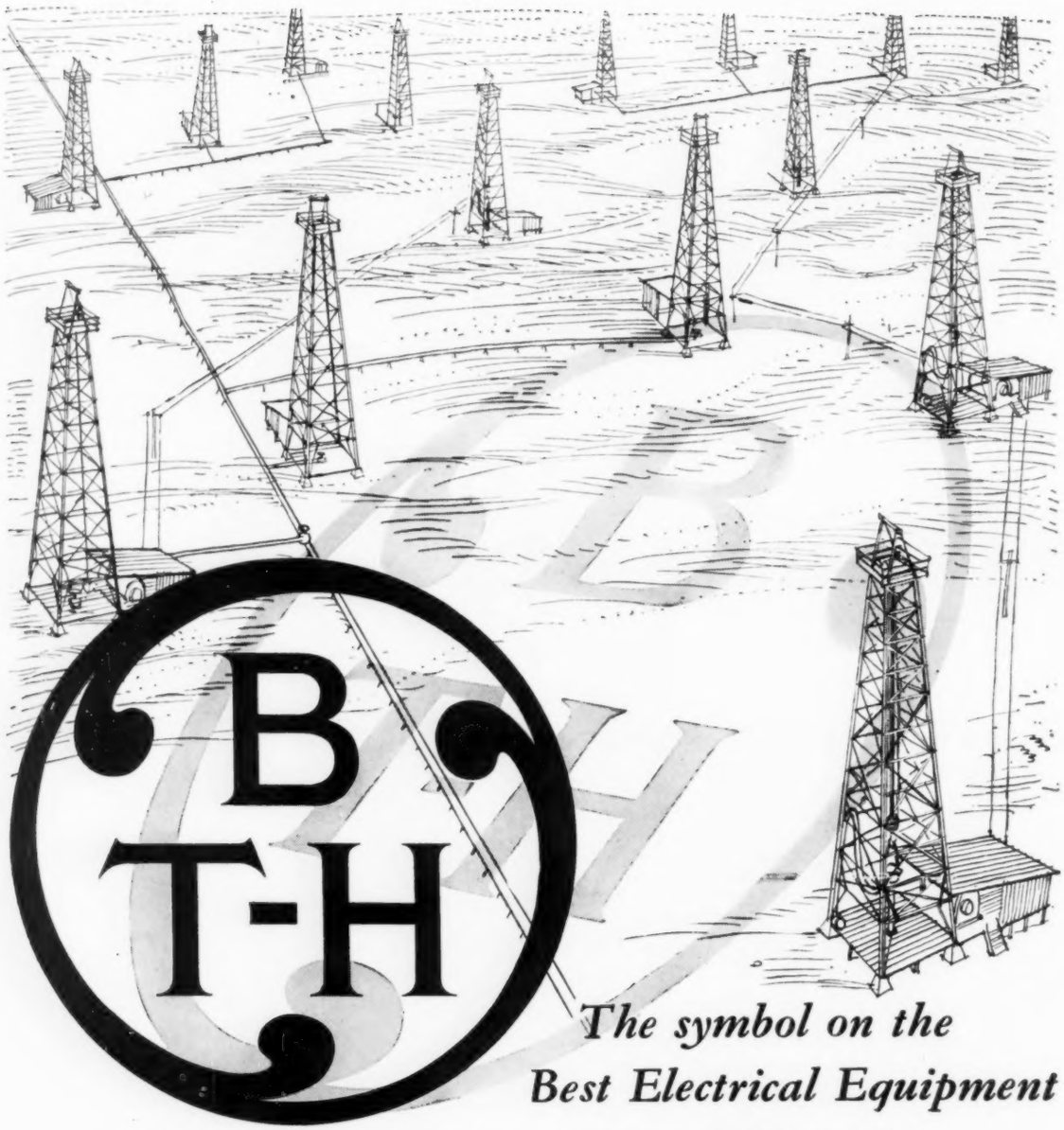
Offices in Principal Cities Throughout the World

CLARK®

Packaged Field Compressors



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Best Electrical Equipment

Hard and continuous service is demanded of any electrical equipment in the oil industry. That is why in the fields so many of the generators, motors, starters, and other devices bear the initials BTH—symbol of sound design and of guaranteed reliability in service.

But this is only one direction in which the specialisation and long experience of BTH have built up an enviable reputation. It is the same in mining, power supply, traction, marine engineering, and general industry—wherever first-class electrical products are needed. With over fifty-four years' experience and eleven factories, BTH can give outstanding service to industry in every sphere of electrical engineering.

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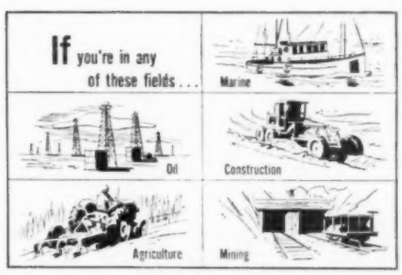
NO BATTERIES - NO CABLES - NO PUMPS - NO PLUMBING - ONLY A HAND CRANK

Your Engine-starting Troubles ELIMINATED

The Bendix Inertia Starter is a rugged, simple and dependable starting device which can be fitted to most engines. It is a complete self-contained unit for cranking your engine wherever it is, whenever you need it.

Unaffected by climate, vibration or other conditions of service. Simple to install. Simple to operate. Cranking can be extended to side, front or above engines by use of extension shafts, couplings and universal joints.



For Installations Where

- A rugged, simple and dependable starting device is essential
- Battery maintenance is a problem
- Shock conditions cause maladjustment of voltage regulation
- Shock conditions are damaging to electric storage batteries
- There is a fire hazard
- There is limited mounting space

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Phone: VICTORIA 5878/9. Cables: AIRPUMPS, SOWEST, LONDON.

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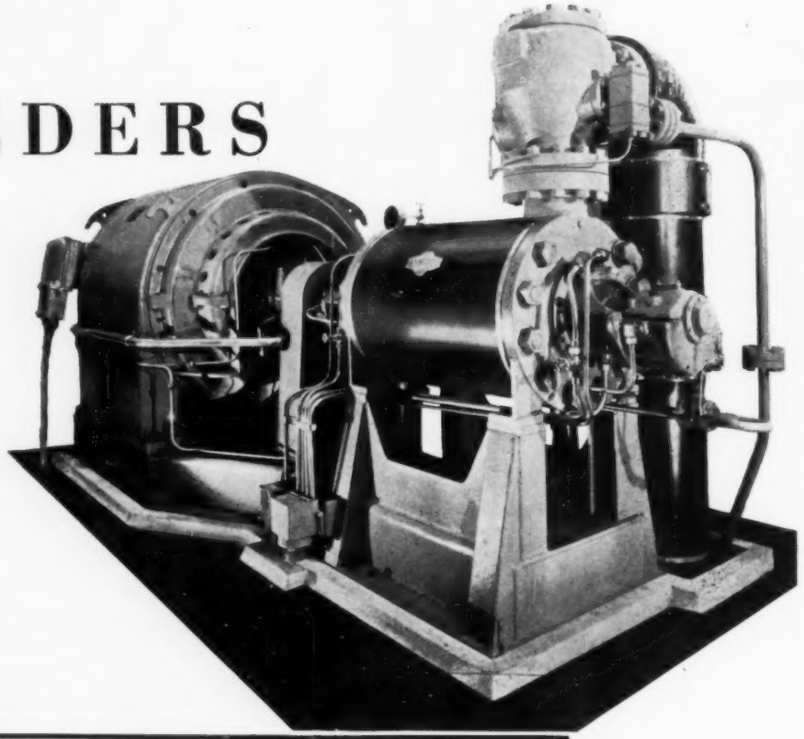

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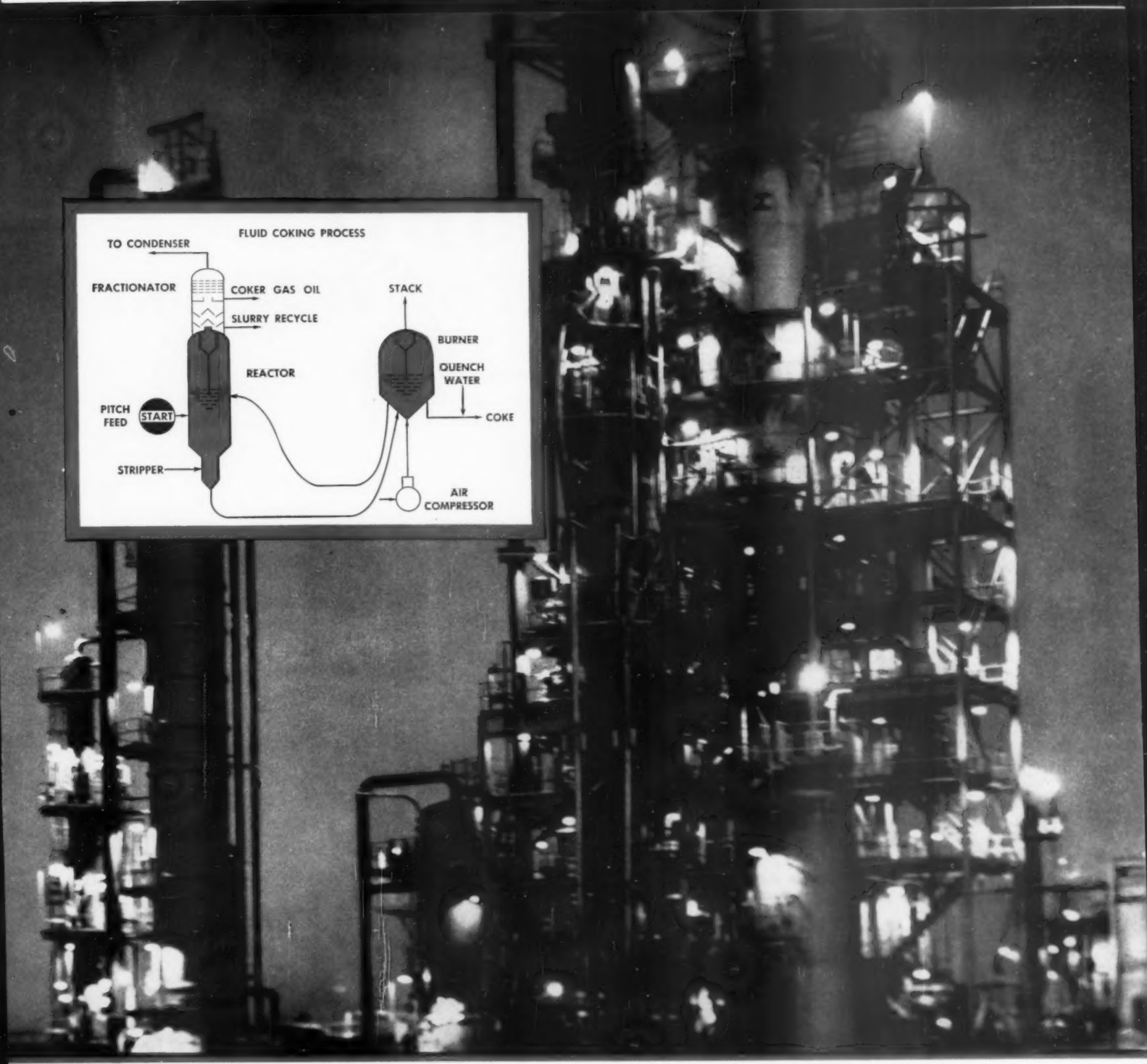

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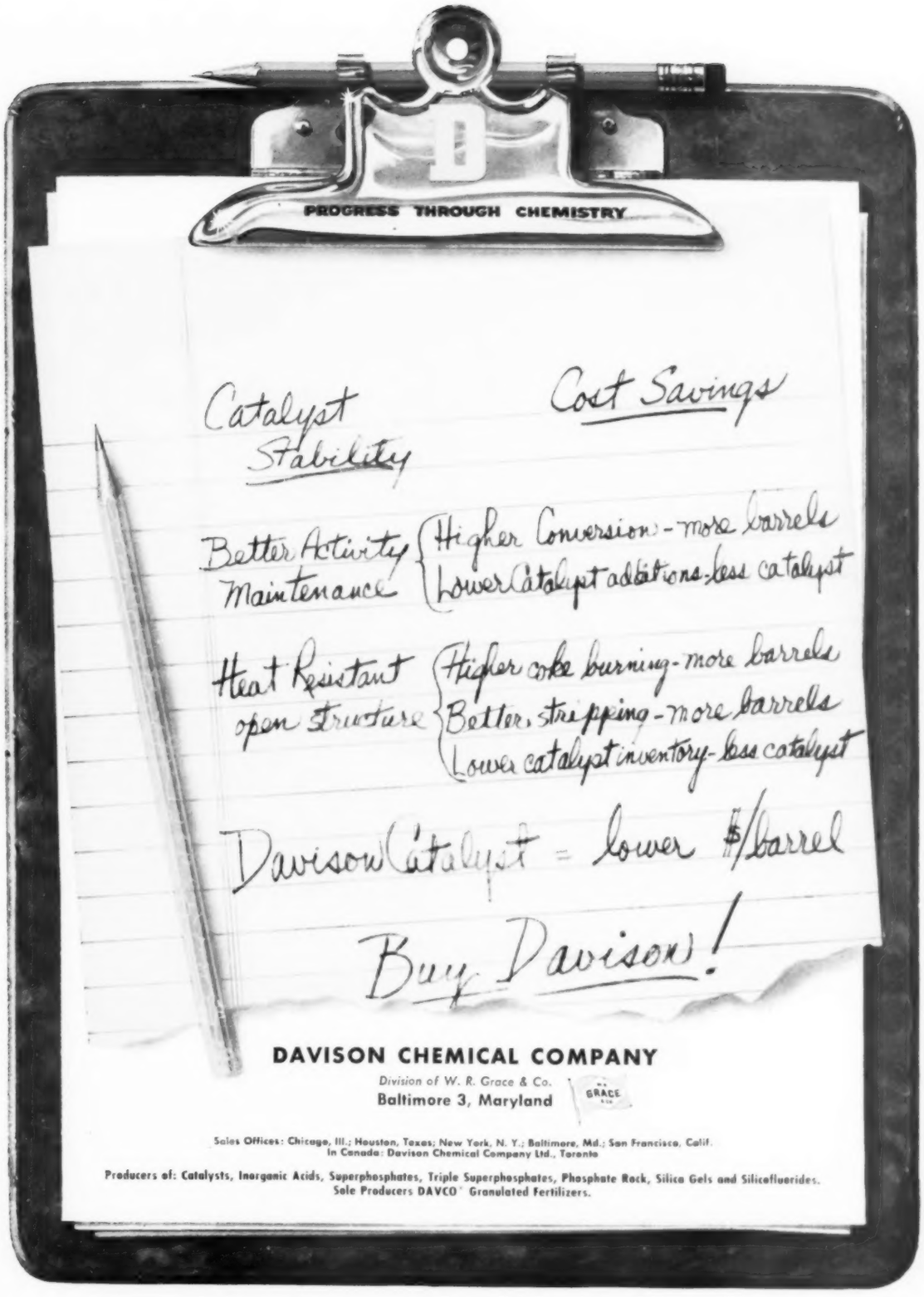
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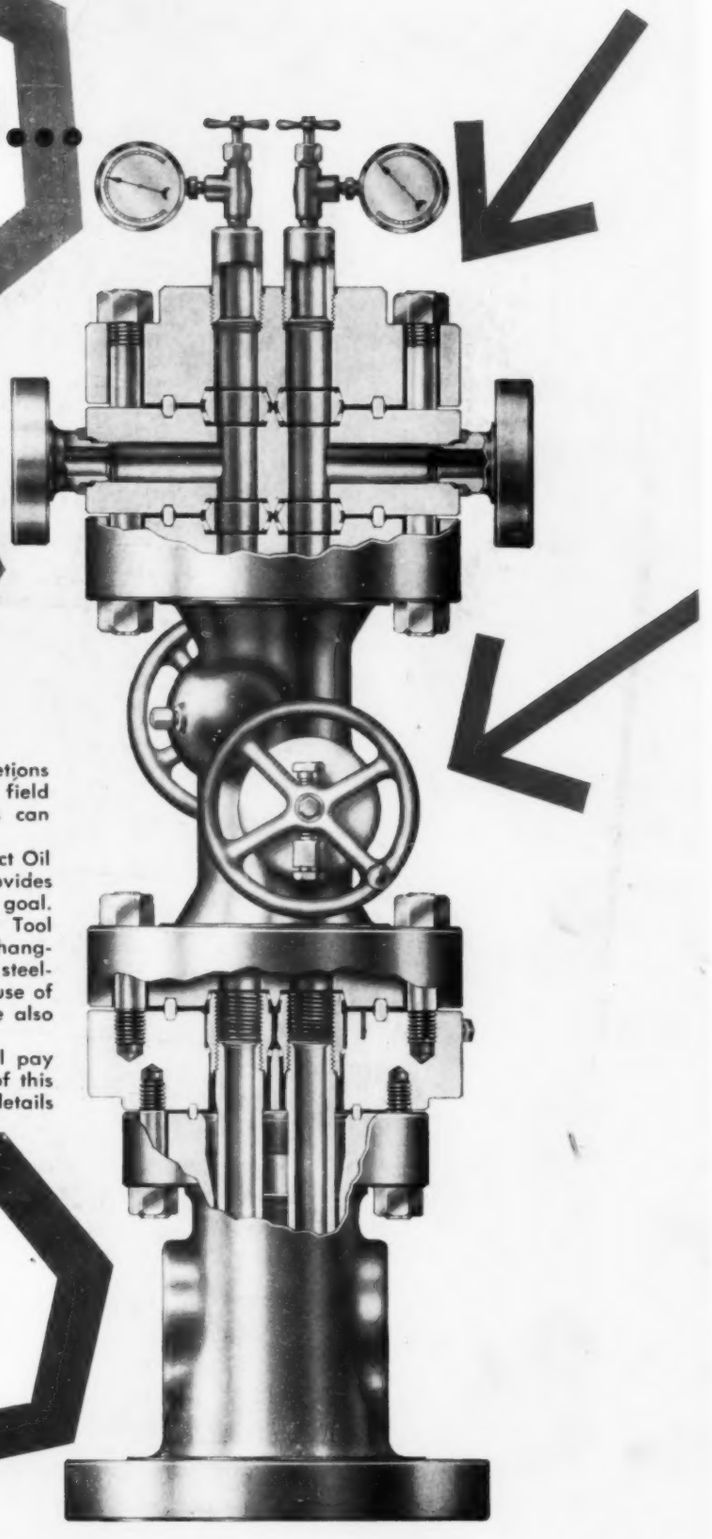

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FROM AN EQUIPMENT STANDPOINT, this compact Oil Center Tool Company Christmas Tree assembly provides a safe, strong and practical means to the economic goal.

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